Public Health
JUN 22 1959
JUN 24 1959

JUNE 1959
VOL. 1 NO. 6

Journal of Occupational Medicine

CONVENTION ISSUE

- SCURVY AS AN OCCUPATIONAL DISEASE ..... *Carey P. McCord, M.D.*
  The 1959 Sappington Memorial Lecture
- AN IMMUNOLOGICAL APPROACH TO SILICOSIS ..... *E. C. Vigliani and B. Pernis*
- DETECTION AND MANAGEMENT OF EMOTIONAL DISORDERS BY AN INDUSTRIAL PHYSICIAN ..... *John G. Hipps, M.D.*
- DERMATITIS IN A CHEMICAL INDUSTRY ..... *William R. Buckley, M.D., and John L. Norris, M.D.*
- TOPICAL REVIEW
  Toxicology of the Fatty Acids ..... *Edward V. Henson, M.D.*
- ASSOCIATION ACTIVITIES—1959 INDUSTRIAL HEALTH CONFERENCE
  Annual Business Meeting
  Presentation of Awards
  Personnel Announcements

Complete Table of Contents on Page *3a*

OFFICIAL PUBLICATION OF THE INDUSTRIAL MEDICAL ASSOCIATION

because Neo-Polycin Ointment

helps clear topical infections promptly

Neo-Polycin® provides neomycin, bacitracin and polymyxin, the three antibiotics preferred for topical use because this combination is effective against the *entire* range of bacteria causing most topical infections...has a low index of sensitivity...and averts the risk of sensitization to lifesaving antibiotics, since these agents are rarely used systemically. And Neo-Polycin provides these three antibiotics in the unique Fuzene® base, which releases higher antibiotic concentrations than is possible with grease-base ointments.

Each gram of Neo-Polycin contains 3 mg. of neomycin, 400 units of bacitracin and 8000 units of polymyxin B sulfate in the unique Fuzene base. Supplied in 15 Gm. tubes

PITMAN-MOORE COMPANY, DIVISION OF ALLIED LABORATORIES, INC., INDIANAPOLIS 6, INDIANA

Vol. I No. 6
ISSUE OF JUNE 1959

Journal of Occupational Medicine

Official Publication of the Industrial Medical Association

TABLE OF CONTENTS

TEXT SECTION

Original Articles

SCURVY AS AN OCCUPATIONAL DISEASE.....315
The 1959 Sappington Lecture
Carey P. McCord, M.D.

AN IMMUNOLOGICAL APPROACH TO SILICOSIS....319
E. C. Vigliani and B. Pernis

DETECTION AND MANAGEMENT OF EMOTIONAL DISEASE BY THE INDUSTRIAL PHYSICIAN.....329
John G. Hipps, M.D.

DERMATITIS IN A CHEMICAL INDUSTRY.....333
William R. Buckley, M.D., and John L. Norris, M.D.

Topical Review

TOXICOLOGY OF THE FATTY ACIDS.....339
Edward V. Henson, M.D.

Editorials

SILICOSIS, A DISEASE OF AUTOIMMUNITY.....346

CHANGING THE GUARD 347

The President's Message 348

Book Reviews 349

Abstracts

CLINICAL TOXICOLOGY 350
Lee H. Miller, M.D., I.M.D.

NOISE AND HEARING 351
H. O. Parrack, Ph.D.

Abstracts (continued)

RADIATION HEALTH 352
Thomas S. Ely, M.D.

DERMATOLOGY 353
William R. Buckley, M.D.

MENTAL HEALTH 354
Graham C. Taylor, M.D.

REPARATIVE SURGERY 356
Robert J. Trettin, M.D.

INTERNAL MEDICINE 357
Leo J. Wade, M.D.

EXPERIMENTAL TOXICOLOGY 358
Robert E. Eckardt, Ph.D., M.D.

MEDICAL CARE ADMINISTRATION 360
Asa Barnes, M.D.

INDUSTRIAL HYGIENE 361
Edward C. Riley, M.D.

GENERAL SECTION

Industrial Medical Association

OFFICERS AND DIRECTORS *6a*

ASSOCIATION ACTIVITIES
1959 INDUSTRIAL HEALTH CONFERENCE
Annual Business Meeting *12a*
Presentation of Awards *18a*
Personnel Announcements *25a*

About the Authors *27a*

List of Advertisers *28a*

People and Events *29a*

Journal of Occupational Medicine is published by the Industrial Medical Association, 28 East Jackson Boulevard, Chicago 4, on the 15th of each month. Second class postage paid at Chicago, Illinois. Copyright 1959 by the Industrial Medical Association.

Subscriptions $10.00 per year—U. S. and foreign. Single copies $1.00 postpaid. Make checks payable to Journal of Occupational Medicine.

Change of address notices received by the end of any month will assure delivery of the following month's issue. Address change is facilitated if old address is also furnished.

Subscriptions, changes of address, and all business matters, including advertising, should be addressed to Clark D. Bridges, Publication Manager, Journal of Occupational Medicine, 28 East Jackson Boulevard, Chicago 4.

Manuscripts submitted for publication should be sent direct to the Editor, Adolph G. Kammer, M.D., 2057 Beechwood Boulevard, Pittsburgh 17, Pennsylvania.

Journal of Occupational Medicine

Official Publication of the Industrial Medical Association

EDITOR

ADOLPH G. KAMMER, M.D.
University of Pittsburgh
Pittsburgh, Pennsylvania

EDITORIAL BOARD

PAUL J. BAMBERGER, M.D.
Bethlehem, Pennsylvania

RUSSELL G. BIRRELL, M.D.
Toronto, Ontario

RONALD F. BUCHAN, M.D.
Boston, Massachusetts

EDWARD V. HENSON, M.D.
South Charleston, W. Va.

FRANK PRINCI, M.D.
Cincinnati, Ohio

IRWIN SCHULZ, M.D.
Milwaukee, Wisconsin

LITERATURE ABSTRACTERS

Dermatology

DONALD J. BIRMINGHAM, M.D.
RAYMOND R. SUSKIND, M.D.
Cincinnati, Ohio

Noise & Hearing

H. O. PARRACK, Ph.D.
Wright-Patterson Air
Force Base, Ohio

Internal Medicine

SHERMER H. STRADLEY JR., M.D.
Wilmington, Delaware
JOHN J. THORPE, M.D.
LEO J. WADE, M.D.
New York, New York

Medical Care Administration

ASA BARNES, M.D.
Louisville, Kentucky

Mental Health

GRAHAM C. TAYLOR, M.D.
Montreal, Quebec

Industrial Hygiene

EDWARD C. RILEY, M.D.
Rochester, New York

Orthopedic Surgery

OWEN E. MILLER, M.D.
Milwaukee, Wisconsin
ROBERT W. BAILEY, M.D.
Ann Arbor, Mich.

Radiation Health

THOMAS S. ELY, M.D.
Washington, D. C.

Reparative Surgery

JOSEPH M. DZIOB, M.D.
Lackawanna, New York
ROBERT J. TRETTIN, M.D.
Milwaukee, Wis.

Clinical Toxicology

LEE H. MILLER, M.D., I.M.D.
Cincinnati, Ohio

Experimental Toxicology

ROBERT E. ECKARDT, Ph.D., M.D.
Linden, New Jersey

Publication Manager
CLARK D. BRIDGES

Assistant Publication Manager
DORIS L. FLOURNOY

28 E. Jackson Blvd., Chicago 4, Illinois

SUGGESTIONS TO AUTHORS

Materials for publication should be addressed to the Editor, 2057 Beechwood Boulevard, Pittsburgh 17. Articles will be considered for publication on condition that they are submitted solely to the *Journal of Occupational Medicine*.

The manuscript, including references, footnotes, and legends for illustrations, should be typed on one side of a standard-sized page of opaque paper, double-spaced, and with at least a one inch margin at each edge. One carbon copy should accompany the original typescript, and the author should retain a carbon copy for use in reading galley proofs.

The authors' names should be accompanied by the highest academic or medical degrees that they hold; letters indicating membership in honor or professional societies will not be published. Authors who are in the armed services should not use civilian degrees in connection with their names. The city of each author should be supplied, and an address should be provided at the end of the manuscript for the use of readers who may wish to communicate with the senior author. If academic, hospital, or industrial connections are given for one author, they must be given for all other authors who have such connections. The authors are responsible for obtaining permission from the proper authorities to use the names of institutions.

References to the literature should be limited to those used in preparation of the manuscript; they should be typed on a special page at the end of the manuscript and should be in the style of those used in the scientific publications of the American Medical Association. Titles of all articles must be given.

Charts and drawings should be in black ink on hard, white paper. Lettering should be large enough to permit necessary reduction. Oversized illustrations should be photographed and a glossy print submitted. Prints of a bluish tinge will not reproduce well. Paper clips must not be used on prints, since the marks left will show in the reproduction. A label should be pasted to the back of each illustration showing its number, the author's name, an abbreviated title of the article, and an indication of the top of the picture. Each chart and illustration must have a descriptive legend, and each table must have a caption.

RUBBER ELASTIC BANDAGE

STANDS OUT BECAUSE IT STANDS UP

under constant use—With a **tensile strength greater than any competitive bandage,** amazing new ACE has increased resistance to tearing built into every strand. Even after repeated wear and laundering, ACE continues to provide firm, anatomically correct support.

under higher heat—Even **15 hours of dry heat sterilization at 320° F.** can't wilt this new ACE... the specially developed rubber threads retain elasticity to a degree never thought possible before.

for maximum economy—Specify ACE hospital packaging. Individually polyethylene wrapped bandages, 2", 2½", 3" or 4" widths, in boxes of twelve...6" width in boxes of six. Readily available from your nearby distributor—the single source for most of your hospital supplies.

BECTON, DICKINSON AND COMPANY · RUTHERFORD, NEW JERSEY

B-D AND ACE ARE REGISTERED TRADEMARKS OF BECTON, DICKINSON AND COMPANY 60859

Industrial Medical Association

OFFICERS

President:
D. JOHN LAUER, M.D.
Jones & Laughlin Steel Corporation
Pittsburgh 30, Pennsylvania

President-Elect:
R. E. ECKARDT, M.D.
Esso Research & Engineering Co.
Linden, New Jersey

First Vice President:
GRADIE R. ROWNTREE, M.D.
Fawcett-Dearing Printing Co.
Louisville 1, Kentucky

Second Vice President:
H. GLENN GARDINER, M.D.
Inland Steel Company
East Chicago, Indiana

Secretary:
LEONARD ARLING, M.D.
Northwest Industrial Clinic
3101 University Ave., S.E.
Minneapolis 14, Minnesota

Treasurer:
JOHN L. NORRIS, M.D.
Eastman Kodak Co.
Rochester 4, New York

DIRECTORS

1958 - 1961

DONALD C. BEWS, M.D.
Bell Telephone Company of Canada
1050 Beaver Hall Hill
Montreal, Quebec

S. CHARLES FRANCO, M.D.
Consolidated Edison Co. of N. Y.
4 Irving Place
New York 3, N. Y.

ALLAN J. FLEMING, M.D.
E. I. du Pont de Nemours & Co.
Wilmington 98, Delaware

O. TOD MALLERY, M.D.
Employers Mutuals of Wausau
Wausau, Wisconsin

EMMETT B. LAMB, M.D.
International Harvester Co.
Indianapolis 4, Indiana

1959 - 1962

EDWIN DE JONGH, M.D.
Pontiac Motor Division
General Motors Corporation
Pontiac 11, Michigan

LOGAN T. ROBERTSON, M.D.
Consultant, Occupational Health
Asheville, North Carolina

JAMES P. HUGHES, M.D.
Kaiser Aluminum & Chemical Corp.
Oakland 12, California

RICHARD C. SWAN, M.D.
Delco Remy Division
General Motors Corporation
Anderson, Indiana

L. HOLLAND WHITNEY, M.D.
American Telephone & Telegraph Co.
New York 7, N. Y.

EXECUTIVE OFFICES

28 East Jackson Blvd. Chicago 4, Illinois
Telephone WAbash 2-4054

Managing Director
CLARK D. BRIDGES

Assistant Managing Director:
RITA KIRTLEY PACKER

The Industrial Medical Association was organized in 1915 as the American Association of Industrial Physicians and Surgeons. Its first annual meeting was held the following year. In 1951 the present name was adopted.

The purposes of the organization as stated in the certificate of incorporation (not-for-profit) are:

"The object of this Association will be to foster the study and discussion of the problems peculiar to industrial medicine and surgery; to develop methods adapted to the conservation of health among workers in the industries; to promote a more general understanding of the purposes of the medical care for employees; and to unite into one organization members of the medical profession specializing in industrial medicine and surgery for their mutual advancement in the practice of their profession."

Presently, the membership totals nearly 4000 physicians in the United States, Canada, Latin America, and other parts of the world. Physicians "who have an interest in Industrial Medicine" may apply for membership; specialization in this field is not essential. Regionally, the Industrial Medical Association has 14 Component Societies in the United States and one in Hawaii. Most Association members carry their membership through one of the component groups.

The Journal of Occupational Medicine, owned and published by the Industrial Medical Association, is sent monthly to each member as one of the advantages of membership.

The annual business meeting and convention is held in the spring. Since 1945, the convention has been held concurrently with the meetings of four other organizations having related interests—American Industrial Hygiene Association, American Conference of Governmental Industrial Hygienists, American Association of Industrial Nurses, Inc., American Association of Industrial Dentists. This combined meeting is known as the Industrial Health Conference.

The Occupational Health Institute, Inc., is a nonprofit educational organization created by the Industrial Medical Association to promote the cause of health in industry. Since 1951, the Occupational Health Institute has conducted the program of evaluation, approval and certification of Medical Services in Industry, on the basis of standards established by the Standards Committee of the Industrial Medical Association. This program was conducted by the American College of Surgeons for many years until its transfer to the Association.

The Association's headquarters office serves as a focal point for the Association's activities, and through its coordination of information regarding industrial health problems encountered throughout the country, it offers invaluable assistance to members on a host of specific subjects.

ANNUAL MEETING & INDUSTRIAL HEALTH CONFERENCE

War Memorial Auditorium, Rochester, N. Y. **April 26 to 29, 1960**

for
season-long
immunity
to
poison ivy
or
poison oak

keep them on the job with **AQUA IVY, AP®**

alum precipitated pyridine-ivy extract suspended in saline solution

Good to excellent results — up to 93% of cases.[1-6]

". . . superior to either alcohol/ether or the oil resorption materials because of the ease of its administration, its concentrated dosage, and its more effective clinical results along with lessened possibility of exacerbations of symptoms. The alum precipitated material is slowly absorbed".[2]

Non-toxic — non-irritating
". . . even when administered to children . . .".[3]

HOW SUPPLIED In a combination package containing one 5 cc. vial of a 1:50 dilution (0.3 mg./cc.) and one 10 cc. vial of a 1:5 dilution (3.0 mg./cc.) (administration sufficient for at least 3 patients).

REFERENCES

1. Gaillard, G. E.: New York J. Med. 56:14, 1956.
2. Passenger, R. E., Spain, W. C. and Strauss, M. B.: J. Allergy 27: 409-423, 1956
3. Fontana, V. J.: GP 10:47, 1954.
4. Gaillard, G. E.: J. Allergy 21:55, 1950.
5. Strauss, M. B. and Spain, W. C.: J. Allergy 17: 1-10, 1946.
6. Neidorff, H. A.: Personal Communication.

Also available as AQUA IVY, AP® TABLETS for oral prophylaxis in bottles of 100 tablets of 0.6 mg. each. Each tablet contains 0.6 mg. dry alum precipitated pyridine-ivy.

Literature on request — WRITE TO DEPT. J1

SYNTEX CHEMICAL COMPANY, INC.

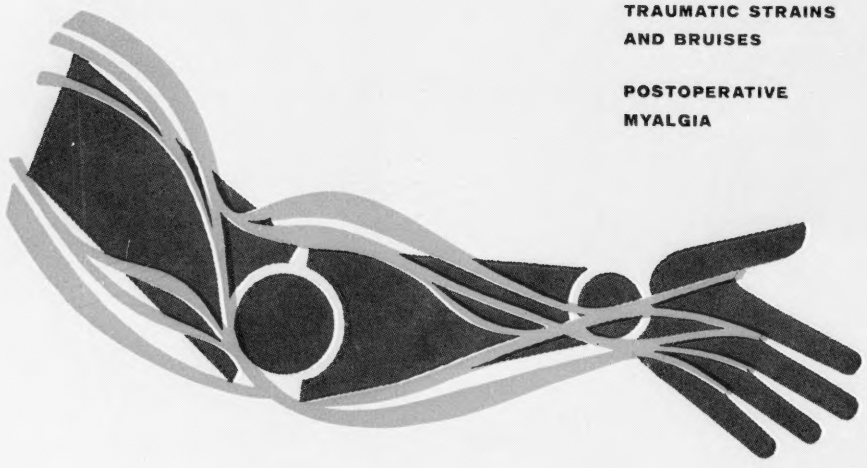
10 East 40th Street, New York 16, N. Y.

NOW

. . . a new way to relieve pain and stiffness in muscles and joints

INDICATED IN:

- MUSCLE STIFFNESS
- LUMBOSACRAL STRAIN
- SACROILIAC STRAIN
- WHIPLASH INJURY
- BURSITIS
- SPRAINS
- TENOSYNOVITIS
- FIBROSITIS
- FIBROMYOSITIS
- LOW BACK PAIN
- DISC SYNDROME
- SPRAINED BACK
- "TIGHT NECK"
- TRAUMATIC STRAINS AND BRUISES
- POSTOPERATIVE MYALGIA



■ Exhibits unusual analgesic properties, different from those of any other drug ■ Specific and superior in relief of SOMAtic pain ■ Modifies central perception of pain without abolishing natural defense reflexes ■ Relaxes abnormal tension of skeletal muscle

SOMA™

N-isopropyl-2-methyl-2-propyl-1, 3-propanediol dicarbamate

■ More specific than salicylates ■ Less drastic than steroids

■ More effective than muscle relaxants

SOMA has an unique analgesic action. It apparently modifies central pain perception without abolishing peripheral pain reflexes. SOMA is particularly effective in relieving joint pain. Patients say that they feel better and sleep better with SOMA than with any previously used analgesic, sedative or relaxant drug.
SOMA also relaxes muscle hypertonia, with its stresses on related joints, ligaments and skeletal structures.

ACTS FAST. Pain-relieving and relaxant effects start in 30 minutes and last 6 hours.

NOTABLY SAFE. Toxicity of SOMA is extremely low. No effects on liver, endocrine system, blood pressure, blood picture or urine have been reported. Some patients may become sleepy on high dosage.

EASY TO USE. Usual adult dose is one 350 mg. tablet 3 times daily and at bedtime.

SUPPLIED: Bottles of 50 white sugar-coated 350 mg. tablets.

Literature and samples on request.

WALLACE LABORATORIES, NEW BRUNSWICK, N. J.

Component Societies of the Industrial Medical Association

THE NEW YORK STATE SOCIETY OF INDUSTRIAL MEDICINE, INC.

President: David H. Goldstein, M.D.
Vice-President: Harry E. Tebrock, M.D.
Secretary-Treasurer: Gerald J. Friedman, M.D.
Corresponding Secretary: Frank M. Dua, M.D.
30 Rockefeller Plaza, Room 2400, N.Y. 20.

Executive Committee

S. Charles Franco, M.D.
Harold Brandaleone, M.D.
F. P. Guidotti, M.D.
Anthony A. Mira, M.D.
R. J. Murray, M.D.
John Neilson, Jr., M.D.
John J. Poutas, M.D.
Thomas G. Rigney, M.D.
Norbert J. Roberts, M.D.
Willis M. Weeden, M.D.
L. Holland Whitney, M.D.

KANSAS CITY INDUSTRIAL MEDICAL ASSOCIATION

President: James R. McVay Jr. M.D.
President-Elect: Arthur B. Rhoades, M.D.
Secretary: Harold Y. Allen, M.D.
6318 Wornall Rd., Kansas City 13.
Treasurer: William H. Duncan, M.D.
1200 Professional Bldg., Kansas City 6.

Directors

Terry E. Lilly Jr., M.D.
C. G. Leitch, M.D.
James J. Lally, M.D.

MICHIGAN INDUSTRIAL MEDICAL ASSOCIATION

President: Harold H. Gay, M.D.
President-Elect: Duane L. Block, M.D.
Vice-President: Richard D. Mudd, M.D.
Secretary-Treasurer: Henry J. Kreulen, M.D., Fisher Body Plant No. 1, General Motors Corporation, Grand Rapids.

Directors

Peter B. Rastello, M.D.
M. W. Shellman, M.D.
Earl E. Weston, M.D.

MINNESOTA ACADEMY OF OCCUPATIONAL MEDICINE AND SURGERY

President: T. E. Barber, M.D.
Vice-President: J. A. Williams, M.D.
Secretary: R. W. Goltz, M.D., 825 Nicollet Ave., Minneapolis 2.
Treasurer: B. I. Derauf, M.D.
Recorder: Earl Opstad, M.D.

Executive Committee

Orley Foster, M.D.
James R. Fox, M.D.
John F. Shronts, M.D.

NEW ENGLAND INDUSTRIAL MEDICAL ASSOCIATION

President: Norman White, M.D.
Vice-President: Francis LeBaron, M.D.
Secretary-Treasurer: James I. Roberts, M.D., 441 Stuart Street, Boston 16.

Board of Directors

G. Garfield Defoe, M.D.
John Malloy, M.D.
Harry Mushlin, M.D.
A. Duncan MacDougall, M.D.
William D. Thibodeau, M.D.

CENTRAL STATES SOCIETY OF INDUSTRIAL MEDICINE AND SURGERY

President: Richard A. Sutter, M.D.
President-Elect: Paul J. Whitaker, M.D.
Vice-President: Eugene L. Walsh, M.D.
Secretary-Treasurer: Allan P. Skoog, M.D., 28 East Jackson Blvd., Chicago 4.

Board of Governors

George A. Cooper, M.D., 1960
Bille B. Hennan, M.D., 1960
Roland A. Jacobson, M.D., 1960
Gordon W. Petersen, M.D., 1960
Richard C. Swan, M.D., 1960
Joseph C. Donchess, M.D., 1961
C. Harlan Johnston, M.D., 1961
G. Prentiss McArdle, M.D., 1961
Harry E. Mock, Jr., M.D., 1961
Paul W. Rush, M.D., 1961
Carl J. Lohmann, M.D., 1962
William L. Macon, Jr., M.D., 1962
J. F. McCahan, M.D., 1962
Arthur K. Peterson, M.D., 1962
Arthur E. Sulek, M.D., 1962

INDUSTRIAL MEDICAL ASSOCIATION OF NEW JERSEY

President: Ralph M. L. Buchanan, M.D.
Vice-President: F. H. DeGrace, M.D.
Secretary: M. R. Vaschak, M.D., E. R. Squibb & Sons, Div. of Olin Mathison Chemical Corp., New Brunswick, N.J.
Treasurer: Thomas F. Nevins, M.D., Esso Standard Oil Co., P.O. Box 222, Linden, N.J.

Directors

George C. Freeman, M.D.
John W. Borino, M.D.
William D. Van Riper, M.D.

NORTHWEST ASSOCIATION OF OCCUPATIONAL MEDICINE

President: Charles M. McGill, M.D.
Vice-President: Forrest E. Rieke, M.D.
Secretary-Treasurer: W. J. Sittner, M.D., 919 Taylor Street Bldg., Suite 410, Portland 5, Ore.
Asst. Secy.: Mrs. Lorna Crosgrove, Swift & Company, North Portland, Ore.

Directors

Eugene P. Owen, M.D., Chairman
B. C. Scudder, M.D.
Sherman M. Williamson, M.D.
Philip A. Fuqua, M.D.
A. John Nelson, M.D.
W. Daggett Norwood, M.D.
I. G. Voth, M.D.
Ralph L. Olsen, M.D.
J. Leon Sealey, M.D.
Ralph R. Sullivan, M.D.

INDUSTRIAL MEDICAL ASSOCIATION OF PHILADELPHIA

President: Allan J. Fleming, M.D.
President-Elect: Walter G. Vernon, M.D.
Secretary: Howard J. Johnson, Jr., M.D.
Corresponding Secretary: C. R. Houchins, Room 1214, Six Penn Center Plaza, Philadelphia 4.
Treasurer: S. F. Brunetti, M.D., 719 Chelter Avenue, Philadelphia 26.

Board of Directors

Howard L. Reed, M.D.
Richard J. Campion, M.D.
F. Curtis Dohan, M.D.
Gilbert B. Meyers, M.D.
Lamson Blaney, M.D.
Thomas H. Hogshead, M.D.
John M. Trapnell, Jr., M.D.

INDUSTRIAL MEDICAL ASSOCIATION OF PITTSBURGH

President: D. John Lauer, M.D.
President-Elect: Daniel V. Dougherty, M.D.
Vice-President: Daniel C. Braun, M.D.
Secretary-Treasurer: Merle Bundy, M.D., United States Steel Corporation, 525 William Penn Place, Pittsburgh 30.

Directors

1957-59
Joseph A. Llewellyn, M.D.
Bernard A. McAleer, M.D.
James L. Thompson, M.D.
Don A. Kelly, M.D.

1958-60
E. V. Henson, M.D.
Warren L. Hogue, Jr., M.D.
Edward M. Kline, M.D.

HAWAIIAN ASSOCIATION OF PLANTATION PHYSICIANS

President: Edward B. Underwood, M.D.
Vice-President: Richard Y. Noda, M.D.
Secretary-Treasurer: Garton E. Wall, M.D., Ewa, Oahu.
Executive Secretary: Mrs. Betty Arnott, 1527 Keeaumoku St., Honolulu, Oahu, Hawaii.

TEXAS INDUSTRIAL MEDICAL ASSOCIATION

President: Max E. Johnson, M.D.
President-Elect: Noble B. Daniel, M.D.
Vice-President: Carl A. Nau, M.D.
Secretary-Treasurer: J. G. Burdick, M.D., P.O. Box 472, Ethyl Corp., Pasadena.

Directors

Ervin E. Baden, M.D.
Val C. Baird, M.D.
Robert J. Potts, M.D.
Robert A. Wise, M.D.

WESTERN INDUSTRIAL MEDICAL ASSOCIATION

President: Edward J. Zaik, M.D.
Vice-President: Verne G. Ghormley, M.D.
Secretary: Esther Klingsheim, AiResearch Manufacturing Company, 9851 Sepulveda Blvd., Los Angeles 45.
Treasurer: Clarence Lee Lloyd, M.D.; **Assistant Treasurer:** Mrs. Olga Wolf, North American Aviation, Inc., Los Angeles 45.

Board of Directors

David D. Holaday, M.D., Chairman
Vance M. Strange, M.D., 1959
Clark R. Miller, M.D., 1959
C. H. McCallister, M.D., 1960
James P. Warren, M.D., 1960
L. O. Desimone, M.D., 1961
John H. Leimbach, M.D., 1961

WESTERN NEW YORK SOCIETY OF INDUSTRIAL MEDICINE AND SURGERY

President: Joseph T. Andrews, M.D.
President-Elect: James H. McDonough, M.D.
Secretary: George A. Hardie, M.D., Eastman Kodak Co., 343 State St., Rochester 4, N. Y.
Treasurer: Elsa K. Chaffee, M.D., Kodak Park Works, Eastman Kodak Co., Rochester 5, N. Y.

Directors

Joseph C. Klein, M.D., 1961
Robert H. Mehnert, M.D., 1961
Dallas E. Billman, M.D., 1960
Joseph M. Dziob, 1960

FRIDAY

1959 MARCH 1959						
SUN	MON	TUE	WED	THU	FRI	SAT
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

27
MAR.
1959

the sulfa tablet he took yesterday morning...

is still working this morning

SATURDAY

1959 FEBRUARY 1959						
S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28

28
MAR.
1959

1959 APRIL 1959						
S	M	T	W	T	F	S
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

Midicel®

(sulfamethoxypyridazine, Parke-Davis)

maintains effective sulfa levels for 24 hours with a single tablet

In addition to its prolonged effect, MIDICEL provides these other significant clinical advantages: ***1 tablet-a-day schedule***—greater convenience and economy for patients • ***rapid effect***—prompt absorption • ***wide antibacterial spectrum***—effective in urinary tract infections, upper respiratory infections, bacillary dysenteries, and surgical and soft tissue infections, due to sulfonamide-sensitive organisms • ***well tolerated***—low dosage and high solubility minimize possibility of crystalluria.

adult dosage: Initial (first day)—2 tablets (1 Gm.) for mild or moderate infections, or 4 tablets (2 Gm.) for severe infections. Maintenance—1 tablet (0.5 Gm.) daily.

children's dosage: According to weight.

See literature for details of dosage and administration.

available: Quarter-scored tablets of 0.5 Gm., bottles of 24, 100, and 1,000.

PARKE, DAVIS & COMPANY • DETROIT 32, MICHIGAN

72459

Association Activities

Report on the Annual Business Meeting Held in Chicago on April 29, 1959

A summary of the proceedings of the annual business meeting of the Industrial Medical Association held in Chicago on April 29 is presented here for the benefit of the members who were unable to attend.

Fellowships

Fellowship in the Industrial Medical Association was bestowed on 87 physicians representing 20 different states, Canada and Australia. In addressing the candidates, prior to the presentation of certificates, E. A. IRVIN, M.D., said in part:

"You gentlemen should take pride in this accomplishment and recognition, but with each achievement comes new and greater responsibility which must be discharged if progress is to continue. One of your first responsibilities as a Fellow is to review and note the history of the Industrial Medical Association and its objectives, and when you return to your community, it is a further responsibility for you to do everything possible to promote the advancement and betterment of the practice of industrial medicine, and to become an active member in your component society. It is not sufficient to merely become a member. You, and each of us, must go beyond the point of simply meeting our professional requirements as doctors. We must do everything within our power to encourage the development of sound industrial health programs. These programs must be practical and yet they should be broad in scope to protect the health of the individuals on the job. And we should never lose sight of the fact that at all times we should respect the individual's right as to choice of physician for those conditions not related to occupation.

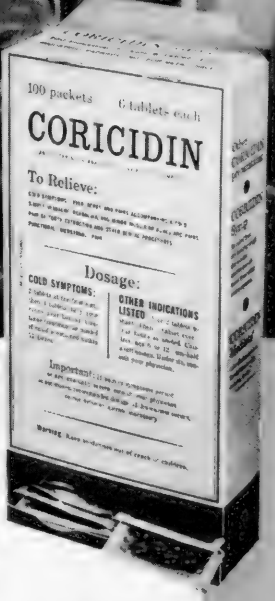
"Now, these principles are the underlying foundation for a sound industrial health program regardless of personal opinions or attitudes or prejudices and there can be no deviation from them if we hope to obtain a uniform and adequate medical service. We must make sure that every physician in industry understands his responsibility in maintaining high standards of service and the effect that his failure to do so will inevitably have on our long range planning. All of us should remember that the quality of medicine and the service which we render in industry and to the patient is the measure by which we will be judged."

Those who were awarded Fellowship Certificates are: JOSEPH T. ANDREWS, BERNARD BEHREND, LEWIS CHARLES BENESH, ALBERT J. BLAIR, STANLEY J. BOCIEK, JAMES J. BRANDL, MERLE BUNDY, WILLIAM B. CAMP, EDWARD W. CAUGHEY, ELSA KREUTZ CHAFFEE, ROGER G. CONANT, RAYMOND L. CONKLIN, GEORGE J. COOPER, JOSEPH A. COSTRINO, SYDNEY CRAWCOUR, WALLACE L. DAVIDSON, PAUL EDWARD DERLETH, LEON O. DESIMONE, EARLE T. DEWEY, F. CURTIS DOHAN, THOMAS J. DOYLE, WILLIAM H. DUNCAN, JOSEPH M. DZIOB, CARLES A. EARL, MATTHEW E. FAIRBANK, LOUIS B. FOLSOM, DONALD K. GRANT, STANLEY GREENHILL, BENJAMIN A. GROSS, LEWIS C. HASLAM, WALTER W. HASSIG, RALPH W. HASWELL, JOHN H. HEGE, THOMAS H. HOGSHEAD, GORDON A. HOLDEN, VENCEL WILLIAM HOLLO, MEREDITH HOSKINS, WILLIAM G. HUME, WILLIAM JEND, JR., DONALD A. KELLY, NORVIN C. KIEFER, EUSTACE EUGENE KING, III, JOHN CHARLES KINZLY, HALLETT A. LEWIS, HENRIK W. LOCKE, ICCHOK JAKOB MANKOWSKI, ELLSWORTH F. MARRINER, WILLIAM A. MCCLELLAN, EDWIN A. MCGOVERN, ROBERT D. MCINTOSH, ROBERT H. MEHNERT, CHARLES I. MILLER, EMIL KENNETH MOSNY, ALFRED J. NELSON, JOHN B. NICOSIA, EUGENE P. OWEN, GORDON W. PETERSON, CHARLES W. PETERSON, JR., WALTER F. PRENDERGAST, HAROLD W. PRINCE, SARAH EMILY PRINDLE, JACOB G. PROBSTEIN, VINCENT E. RAY, ROSCOE H. REEVE, ARTHUR B. RHOADES, DEAN M. RICHMOND, JAMES RYAN, CARL J. SCHOPFER, BERNARD J. SCHUMAN, FREDERICK P. SHAFER, WILLIAM L. SHIELDS, WILHELM J. SITTNER, HOWARD P. STAUB, VERNON C. STEHR, LEON ARTHUR STETSON, CHARLES R. SULLIVAN, JR., JOHN R. SULLIVAN, JOHN M. TRAPNELL, WALTER G. VERNON, HARRY R. WALKER, JEAN DEGARMO WATKEYS, REGINALD E. L. WATSON, FREDERICK J. WEISMILLER, JR., JOHN D. WELCH, JOHN A. WILLIAMS, SHERMAN M. WILLIAMSON, AND HAROLD E. ZITTEL.

Managing Director's Report

CLARK D. BRIDGES, Managing Director, gave a report to the membership, as follows:

"I have been asked to tell the members why there is a JOURNAL OF OCCUPATIONAL MEDICINE. Occasionally a member will ask why there are two or three journals in this field now; why did the Association undertake the publication of its own journal? In finding the answers I talked to a number of former presidents, other members, and went back through the files of the Association as far as 1939. In that year, DR. C. O. SAPPINGTON was appointed by the president of this Association as the first chairman of the Committee on Publications and Editorial Policy. Apparently no records were kept of this committee's activity because in 1946 a new committee under the chairmanship of DR. EDWARD T. HELLER, reported they had been unable to find any records that set forth policy and procedure for guidance of the committee. This committee explored the entire relationship of our Association with the independently owned journal, *Industrial Medi-*



CORICIDIN
TABLETS

taken at work or at home

cuts down absenteeism due to

colds

dysmenorrhea

muscular aches and pains

Available in convenient industrial dispensing package containing 100 packets of 6 tablets each.

CORICIDIN,® brand of analgesic-antipyretic.

Schering

SCHERING CORPORATION • BLOOMFIELD, NEW JERSEY CN-J-619

cine, which had the distinction of being known as our official publication. An attempt to determine the origin of the official relationship ensued. It appears that in 1933 DR. VOLNEY CHENEY, our Secretary, was finding it difficult to publish the Bulletin that was then serving the Association, and an arrangement was made with *Industrial Medicine* to serve as the Association's official journal.

"The 1946 committee considered the question of associate editors of the journal and commented: 'The American Association of Industrial Physicians and Surgeons has no voice in the selection of this panel of distinguished physicians and surgeons.' At that time an agreement was made with the publishers of *Industrial Medicine* that the Association would be consulted in the appointment of associate editors. Other comments were: 'In the discussion of the progress reports made by this committee in the past two years it has been apparent that our Board and our membership throughout the country feel a sense of responsibility for the editorial, scientific and advertising policy of *Industrial Medicine* . . . . the publishers have sought the advice of this committee on occasion in the matter of certain advertisements. In reverse this committee has frequently reported complaints coming to it . . . . in this whole field there is room for improved relations . . .'

"Subsequently, the reports of other committees indicated periods of dissatisfaction with editorial content and advertising content, both as to amount and quality. There would follow discussions with the publishers and things would quiet down for a while. For example, in 1948, a committee report states: 'The January, 1948, issue evidences an important step in the improvement of *Industrial Medicine*.' This was the outgrowth of an agreement reached in December, 1947, between the publishers and the officers of the Association. But things had a way of improving and then deteriorating. The situation developed to such a point that, in the fall of 1957, the President of the Industrial Medical Association appointed a special committee to explore the current journal problem. In January, 1958, the committee recommended:

"'The Industrial Medical Association can and should publish its own journal as soon as practicable. This can be accomplished in either of two ways: (1) by purchasing the present journal of *Industrial Medicine and Surgery*, or (2) if purchase cannot be satisfactorily arranged, by severing relations with the present owners of the journal of *Industrial Medicine and Surgery* and publishing an entirely new journal to be owned by the Industrial Medical Association.'

"The reasons given by the committee were: 'It was our thinking that the present journal is unsatisfactory for the following reasons: (1) The Industrial Medical Association does not have complete control of the editorial policy or of the content of the journal with regard to both scientific matter and the type of advertising. (2) Considerable financial profit has been and is being made by the present owners of the journal. This income could be used by the Association for the advancement of industrial medicine.'

"The committee further commented: 'Should the Industrial Medical Association purchase the present journal? It is our conclusion that this would be the most desirable course of action if proper agreement could be reached with the owners of the journal.' A subsequent discussion by the owners with our Board of Directors resulted in the following statement by the owners: 'Under the present circumstances the journal of *Industrial Medicine and Surgery* is not for sale.'

"This was followed by discussions with several publishers; a number of profit sharing arrangements were explored. We entered into an agreement with one firm and after several months of work, it became evident that we had made a poor selection, so we started over.

"We interviewed some more publishers and examined their propositions. Gradually it dawned upon us that our membership list provided a mighty solid foundation for establishment of *our own* journal. Finally, one September afternoon last year your executive committee decided that the Industrial Medical Association should undertake publication without benefit of outside publishers. We found a printer and we found a staff. We have DORIS FLOURNOY, who was associated with the other journal but resigned when they moved to Miami in July, 1958. We also have a top flight manuscript editor. We did hundreds of new things—the office staff pitched in and we learned how to publish a magazine. We sold space to advertisers. The directors and officers pitched in, too. Our editor learned the art of being an editor—and about all the labor involved. It has been a real pleasure to work with DOLPH KAMMER and his wife, who serves as his secretary. They have done a tremendous job.

"Now for some figures. We have about 4000 active members of the Association who get the journal regularly. We have at this time 715 non-member paid subscribers, so our circulation is now over 4700 copies. This exceeded our most optimistic guess. Actually we estimated 500 non-member subscribers by the end of the year. In addition to all the good advice we got, there were many prophets of doom—that we were not going to survive the first three months, that we wouldn't have over five pages of advertising. The April issue had 14 pages of advertising, and we are only five pages of advertising away from being on the black side of the ledger.

"Our advertising is screened by a committee. The amount per issue will be restricted to not more than 40% ads to 60% text.

for routine cleansing . . .
and a clear
proctoscopic field[1]

FLEET ENEMA

Disposable Unit

"Proctoscopies are included in our routine physicals. Of 1000 cases, prepared with FLEET ENEMA Disposable Unit, *only one* did not present a clear field."[2]

FLEET ENEMA Disposable Unit may be office-administered. The two-inch, anatomically correct, pre-lubricated rectal tube guards against possible injuries resulting from a longer tube.[3] Each ready-to-use 4½ fl. oz. unit contains, per 100 cc, 16 Gm. sodium biphosphate and 6 Gm. sodium phosphate . . . Pediatric Size 2¼ fl. oz.

Also gentle, prompt, thorough . . . PHOSPHO® SODA (Fleet), a saline laxative of choice. Contains, per 100 cc, 48 Gm. sodium biphosphate, 18 Gm. sodium phosphate.

C. B. FLEET COMPANY, INC., *Lynchburg, Virginia*

References: 1. Nesselrod, J. P., Postgrad. Med., *24*:123, 1958. 2. Rigney, T., (Paper to N. Y. S. Ind. Med. Soc. N. Y. C., 10/1/58.) 3. Frech, H. G. and Lanier, L. R., Am. Jl. Obst. & Gyn. *74*:146, 1957.

Association Activities

We now have an eastern advertising representative. We will also appoint one in the midwest and far west. We get 50 unbound copies of our journal for our office to build up our reprint files—the files that DR. HOLMBLAD has built up so patiently all these years.

"Many other Association activities of the past year, will be covered in DR. LAWRENCE'S report which follows. However, in my other uniform, that of the OHI, I want to report briefly that the Occupational Health Institute, is still in low gear; it is solvent and we are starting to move again. The accreditation program continues. We have a new brochure describing the OHI which is just off the press this week. We are using our control of our JOURNAL to get access to functional reprints for OHI services. For example, the series on heart disease in the March JOURNAL OF OCCUPATIONAL MEDICINE will be reprinted and specially bound in paper and will be announced in management journals very shortly."

President's Report

DR. H. W. LAWRENCE, president for the 1958-1959 term, reported to the membership:

"The Executive Committee has asked me to give you a brief resumé of the highlights of the year's activity. I can only say to you that the year in general has been characterized as one of expansion. As you know, we began to publish our own journal. We also began a rather extensive membership drive. We expanded our headquarters office both physically and personnel-wise. We also formulated various personnel policies for the staff in the headquarters office. We terminated the arrangements with our present Director of Exhibits, STEVE HALOS. We accepted the Minnesota Academy of Occupational Medicine and Surgery as a component society of the Industrial Medical Association, and we have some more pending which we will report to you later.

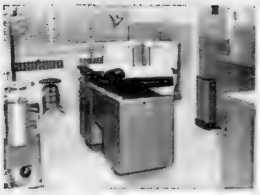
"We are also participating in the promotion of the XIIIth Congress on Occupational Health which is to be held next year in July in New York City. The Occupational Health Institute, incidentally, is acting as a repository for the contributions for this particular Congress. We have established working liason with the National Safety Council, through a Medical Advisory Committee and through our Committee on Standards for Vehicle Drivers. We are working at present with representatives of the American Medical Association through their Council on Industrial Health with a view to establishing a joint Board of Accreditation of Medical Services. As recently as this morning, JACK JONES showed me a letter from DR. BLASINGAME of the AMA to the effect that only one more hurdle remains before this particular objective can be materialized. Through our Committee on Radiation, we will become members of the National Committee on Radiation Protection. Those and many more could be listed.

"Just a word about the JOURNAL—MR. BRIDGES has given you a lot of the detail, but I want to tell you that although some may say this is merely another publication replacing the one we had, this publication represents a great deal of work, planning and money in order to get a good quality product out to you—get a quality product out to the market, you might say—at a certain time, and a certain cost. Eventually it will mean profit to the IMA. It is a little too early to report success, but DR. LAUER next year reporting to you will have the actual figures on the first year's experience. I predict confidently that the Journal will be an asset to our membership both financially and journalistically speaking. The fortunate part of this whole thing is that this JOURNAL belongs to you and me, lock-stock-and-barrel, and that is for better or for worse. You are not only the consumer, but you are the producer. I think we will all agree that our editor and his staff have done a magnificent editorial job in the first four issues. We can help with the promotion of advertising, contributing news items, and so forth.

"With regard to our membership drive—we didn't quite reach the goal of 1,000 new members which we set last year, but that was admittedly a pretty ambitious goal. We ended up as of last Friday morning with 828 for the year. We now have 4,069 members in the IMA. Incidentally, this is a 100% increase since 1952, so if we can double it every seven years, we will be all right. Of course we will lose some members by the end of fiscal year because of death, resignation, or non-payment of dues. However, the impetus of this drive will carry on the next year and the year after that if we keep right on pushing it. You can't start a thing one year, and have it hit a level and stop on time. Under the aspiring leadership of an energetic young man, LOGAN ROBERTSON. I think we have done well. Forty percent of our members are full time medical directors and plant physicians and 60% are part-time. There are 150 Canadian physicians, and 150 other physicians spread all over the world.

"I want to say a word about the Association's personnel policy. Fringe benefits were established for our IMA employees at the headquarters office, vacations, hospital group insurance, retirement policy, etc. In other words, the kind of set-up that you have in your own companies. Unfortunately the Association had no so-called invested pension fund. However, in retiring our good friend. DR. HOLMBLAD, adequate financial arrangements were made in the form of a monthly retainer for his services as consultant to the Association. This was in lieu of a pension. Without taking too much of your time in attempting to review all this activity, let me say that our tempo of activity in the Industrial Medical Association has been greatly accelerated in order to adjust to the standard of the times. It is important that we have the resource of dynamic activity to keep up with this operation. I also want to assure you

SINCE 1860



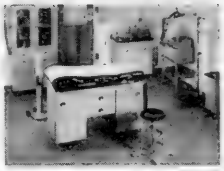
Everything You Need For Your Dispensary or Laboratory

. . . Plus Expert Help in Planning It

Aloe has equipped hundreds of medical departments and laboratories for the nation's leading corporations.
Aloe equipment comes direct from the Aloe factory to you, not through an intervening dealer. Thus, you benefit in two ways: (1) Better equipment at better prices; (2) Specific equipment designed following suggestions by industrial physicians and nurses. Moduline Customized-Unit Casework, Alumiline Dressing Carriage, Aloe Industrial Chair, Drainboard Extremity Dressing Rack, are a few of the Aloe manufactured items most often selected.

Our experienced equipment engineers can help you prepare floor plans, check lists, and budget estimates; saving valuable time, reducing costs, eliminating costly estimates in planning.

For complete details write or mail coupon below.



A. S. ALOE COMPANY

1831 Olive Street, St. Louis 3, Mo.

Complete Equipment for the Industrial Dispensary and Laboratory

16 FULLY-STOCKED DIVISIONS COAST-TO-COAST

A. S. ALOE COMPANY
1831 Olive St., St. Louis 3, Mo.

Please tell us how you can help to plan and equip ☐ Industrial Dispensary; ☐ Laboratory.

Name_____

Address_____

City_____ Zone____ State_____

that your officers, especially your Treasurer, are all convinced that the establishment and close adherence to sound business practice is required to assure our future progress and prestige. I know our membership appreciates the devoted and highly competent work of our members of our headquarters staff — every year their load gets a little bigger. Above all, I want to thank you, our members, for your support, both financially and morally. Without it, we could neither make nor report progress."

Election

Officers and Directors were elected and were reported in the May, 1959, issue of this JOURNAL. The names of the officers and directors also appear on page 6a of this issue.

By-Laws Amendments

The changes in the By-Laws of the Association which were recommended by the By-Laws Committee, and published in the March issue of the JOURNAL OF OCCUPATIONAL MEDICINE, were voted upon and unamimously accepted. The By-Laws, as amended, will be published in full in an early issue of this JOURNAL.

Scientific Exhibits

The four scientific exhibits which were judged to be the award winners were announced by DR. HOLMBLAD as follows: First place — "Misleading Thoracic Roentgenograms"—C. H. HODGSON, M.D., J. A. CALLAHAN, A. J. BRUWER and A. H. BULBULIAN, ODS, Mayo Clinic and the Mayo Foundation; second place —"Bacterial Air Samplers"—U. S. Army Biological Warfare Laboratories; third place — "Marlex Mesh: A New Plastic Mesh for Replacing Tissue Defects" — FRANCIS C. USHER, M.D.; fourth place — "Silicosis Program on Coal Mines in Pennsylvania" — JAN LIEBEN, M.D., and E. F. BAIER, Pennsylvania Department of Health.

Other scientific exhibits were: "Radiation—A Growing Public Health Problem"—DR. ARTHUR B. PRICE, U.S. Public Health Service; "Penicillin Reactions, Their Diagnosis and Treatment" — WILLIAM T. STRAUSS, M.D., SchenLabs Pharmaceuticals, Inc.; "The Metabolism of Industrial Solvents" and "The Biotransformations of Benzene and Benzene Substitutes" — S. LAHAN, M.D., and H. N. MACFARLAND, M.D. Ontario Department of National Health; "Upper Lobe Silicosis"—JOHN B. NICOSIA, M.D., BEN BRAUN, M.D., and JULIUS HEIDEMAN, M.D., St. Catherine Hospital, East Chicago; "Warning Labels" — JAMES D. KITTELTON, Manufacturing Chemists' Association, Inc.; "Wounds and Derman Infections—Prophylaxis and Treatment with Triclobisonium Chloride" — ANGELO D. CALABRESE, M.D., EDMOND EDELSON, M.D., and E. GRUNBERG, Ph.D.; "The Care of Minor Hand Injuries"— A. E. FLATT, M.D., University Hospitals, State University of Iowa; "Management of Ceruminasis by the Industrial Physician" — JAMES KAWCHAK, M.D., Ford Motor Company; "Comprehensive Health Service for Small Plants"—HARRY LAMB, M.D., Occupational Health Institute; "Your Ear and Noise" — ARAM GLORIG, M.D., ANNE SUMMERFIELD, Ph.D., and HOWARD HOUSE, M.D., Research Center, Subcommittee on Noise, American Academy of Ophthalmology and Otolaryngology; "Drug Evaluation in Industrial Medicine: Purposes and Procedures"—BERNARD BEHREND, M.D., and ESTHER JAEGER, B.S., R.N.; "Talc Pneumoconiosis"—ROBERT J. RATAJACK, N.Y. State Department of Labor; "Respiratory Resuscitation Techniques" — PETER SAFAR, M.D., LOURDES AGUTO, M.D., JAMES O. ELAM, M.D., and DAVID D. GREENE, M.D., Armed Forces Institute of Pathology, Walter Reed Hospital; "Environmental Health Engineering in the U.S. Army"—COL. E. J. DEHNE, M.C., Capt. D. W. DETWEILER, M.S.C., and 1st Lt. W. GULEVICH, M.S.C., U.S. Army Environmental Health Laboratory; "Health of the U.S. Army Missilemen"—COL. E. J. DEHNE, M.C., R. H. DUGUID, M.D., and Capt. D. W. DETWEILER, M.S.C., U.S. Army Environmental Health Laboratory; "Sources, Measurement and Effects of Air Pollution"—U.S. Public Health Service.

The largest group of past presidents of the Industrial Medical Association ever assembled attended the 1959 Industrial Health Conference in Chicago in April. Pictured above at the Past-President's luncheon are (seated, left to right): Henry S. Brown, M.D. (1947-1948), Alfred H. Whittaker, M.D. (1949-1950), T. Lyle Hazlett, M.D. (1941-1942), McIver Woody, M.D. (1939-1940), Melvin Newquist, M.D. (1945-1946), H. W. Lawrence, M.D. (1958-1959), Edward C. Holmblad, M.D. (1934-1935), William A. Sawyer, M.D. (1926-1927), Royd R. Sayers, M.D. (1937-1938), and Floyd E. Shaeffer, M.D. (1935-1936). Standing, left to right, are: Jerome W. Shilling, M.D. (1957-1958), George F. Wilkins, M.D. (1953-1954), Kieffer Davis, M.D. (1955-1956), Edward H. Carleton, M.D. (1950-1951), E. A. Irvin, M.D. (1952-1953), D. John Lauer, M.D. (present president, 1959-1960), E. S. Jones, M.D. (1956-1957), and A. G. Kammer, M.D. (1951-1952).

KENACORT

SQUIBB TRIAMCINOLONE

for all your patients starting on corticoids

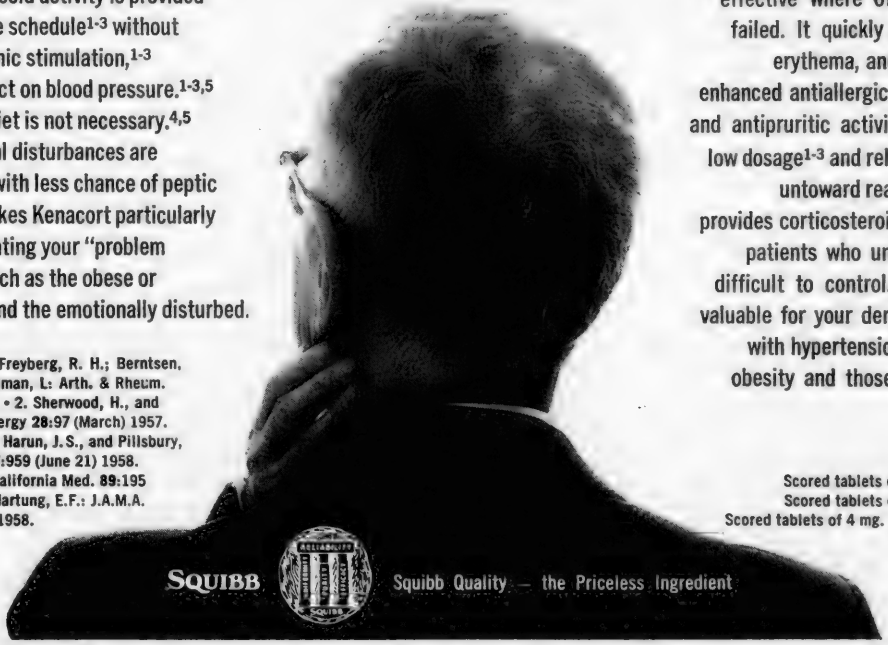
Kenacort safely starts your patients off right — with all the benefits of systemic corticosteroid therapy and few side effects to worry about. Increased corticoid activity is provided on a low dosage schedule[1-3] without edema,[1-4] psychic stimulation,[1-3] or adverse effect on blood pressure.[1-3,5] A low sodium diet is not necessary.[4,5] Gastrointestinal disturbances are negligible[2,4,5] with less chance of peptic ulcer.[4] This makes Kenacort particularly valuable in treating your "problem patients" — such as the obese or hypertensive and the emotionally disturbed.

REFERENCES: • 1. Freyberg, R. H.; Berntsen, C. A., Jr., and Hellman, L: Arth. & Rheum. 1:215 (June) 1958. • 2. Sherwood, H., and Cooke, R. A.: J. Allergy 28:97 (March) 1957. • 3. Shelley, W. B.; Harun, J. S., and Pillsbury, D. M.: J.A.M.A. 167:959 (June 21) 1958. • 4. Dubois, E.L.: California Med. 89:195 (Sept.) 1958. • 5. Hartung, E.F.: J.A.M.A. 167:973 (June 21) 1958.

for all your patients with dermatoses requiring corticoids

Kenacort, particularly in treating inflammatory skin conditions, has proved effective where other steroids have failed. It quickly alleviates itching, erythema, and irritation with its enhanced antiallergic, anti-inflammatory and antipruritic activity. Because of its low dosage[1-3] and relative freedom from untoward reactions,[1-5] Kenacort provides corticosteroid benefits to many patients who until now have been difficult to control. It is particularly valuable for your dermatologic patients with hypertension, cardiac disease, obesity and those prone to psychic disturbances.

SUPPLIED:
Scored tablets of 1 mg. — Bottles of 50
Scored tablets of 2 mg. — Bottles of 50
Scored tablets of 4 mg. — Bottles of 30 and 100



SQUIBB

Squibb Quality — the Priceless Ingredient

'KENACORT'® IS A SQUIBB TRADEMARK

Association Activities

Four Awards in Occupational Medicine Presented by IMA at Annual Banquet

Upon the occasion of its annual banquet, held during the 44th annual meeting in Chicago, the Industrial Medical Association extended honors to those considered most worthy in four different fields of endeavor within the broad concept of occupational medicine—the Knudsen Award for outstanding contribution to industrial medicine —the Meritorious Service Award for outstanding contribution to the Association—the Merit in Authorship Award for excellence in industrial medical literature —the Health Achievement in Industry Award to the management of the industry making the most significant progress in the development and extension of the company health program.

Knudsen Award

The Knudsen Award was established by the late GENERAL WILLIAM S. KNUDSEN in 1939 to recognize a physician who had attained distinction in the field of occupational medicine and hygiene, either through one major contribution or through a continuing contribution, in the fields of research, administration, teaching, practice, or any combination thereof. The award was presented that year by MR. KNUDSEN, who was at that time president of General Motors Corporation, to DR. CLARENCE O. SAPPINGTON. Since then, it has been presented annually with the exception of the year 1945.

The 1958-1959 Knudsen Award was presented to LEMUEL C. MCGEE, M.D. The presentation was made by E. A. IRVIN, M.D., who said, in part:

"Our recipient this year fulfills all of the qualities of human understanding and scientific contributions which were desired by it's founder. Throughout his entire career he has shown a keen interest in people, and an understanding of human relations. He has helped to establish healthful and safe working conditions through research and the application of sound principles of preventive medicine.

"DR. MCGEE was born in New Boston, Texas. He received his Bachelor of Arts degree from Baylor University in 1924; his Ph.D. degree in biochemistry and physiology from the University of Chicago in 1927, and was graduated from Rush Medical College of the University of Chicago as a Doctor of Medicine in 1929. Being a true Texan, he returned to Baylor University for his internship, followed by a year at The Presbyterian Hospital in Chicago. Again he returned to Texas and spent the next four years as an instructor at the Baylor University College of Medicine and was an attending physician at Parkland Hospital in Dallas.

"In 1935, he was appointed Chief of Internal Medicine at the Golden Clinic, Davis Memorial Hospital, Elkins, West Virginia. It was during the four years at this clinic that he became interested in some of the medical problems related to occupation. In 1939, he received a research fellowship in medicine and biochemistry at the Harvard School of Medicine.

"The recipient of the Knudsen Award this year has made many contributions to the field of industrial medicine through teaching, administration, research and practice. His accomplishments and honors are so great I shall mention only a few. He has been certified by the American Board of Internal Medicine and by the American Board of Preventive Medicine in Occupational Medicine; he is a Fellow of the American College of Physicians, the American Gastroenterological Association and the Industrial Medical Association. He has been elected a member of the Society of Sigma Xi, Alpha Omega Alpha, and the Ramazzini Society. He has been active in the American Heart Association, The American Medical Association and is at present serving on the Council of Industrial Health. For many years he has been a visiting professor of Industrial Medicine at the University of Pennsylvania School of Medicine. While serving in this capacity, he found there was

Dr. L. C. McGee (left) receiving the Knudsen award from Dr. E. A. Irvin, with Dr. H. W. Lawrence looking on.

need for a manual dealing with the subject and proceeded to write such a book in 1950. The book is now in its third edition.

"Since 1940, our recipient has been Medical Director of the Hercules Powder Company. To quote one of his staff members, 'He takes a deep interest in everyone and is never too busy to listen, advise, console and treat. We all marvel at his endless enthusiasm and energy in all he does.' On behalf of the Knudsen Award Committee, I am pleased and privileged to present the 1959 Knudsen Award to DR. LEMUEL CLYDE MCGEE."

In accepting the Knudsen Award, DR. MCGEE reviewed the life and philosophy of its originator:

"SIGNIUS WILHELM POUL KNUDSEN at the age of 20 years arrived at Hoboken from Copenhagen, on a cold February day in 1900. His first job was that of a janitor at $15.00 a month, with room and board. One week later he went to work in a shipyard, where he "became tough and quick fisted." He learned English by sitting in the doorway of the apartment house where he lived and talking with the children who were at play.

"Before the end of 1900 the shipyards closed and he got a job repairing locomotive boilers in an Erie Railroad shop in Western New York state. Here he found a veteran boiler maker named Murphy who usually completed his job assignments faster than did the younger boiler makers. Murphy who habitually figured out a job on paper before starting it, explained to KNUDSEN, 'To put it down on paper I have to think about it, and if I think about it enough, it means I won't be making mistakes and wasting time.' This was an early and momentous lesson in production for young KNUDSEN.

"KNUDSEN'S next job was in a bicycle shop where he became foreman of the pedal department which quickly reached a production goal of 2,000 pedals a day. In 1904 the bottom dropped out of the bicycle business as people turned to automobiles for transportation. The bicycle shop began making tools and parts for the model-T Ford. KNUDSEN'S genius for making things was quickly recognized.

Dr. H. W. Lawrence (left), retiring President of the IMA, turns the gavel over to Dr. D. John Lauer.

"At the age of 29 years he was general superintendent in charge of 1,500 people. His subsequent careers with the Ford Motor Company and then the General Motors Corporation are well-known industrial history. In World War II he went to Washington to head up the Office of Production Management, later was commissioned a lieutenant general in the Army and directed production for the War Department.

"I have been informed that BILL KNUDSEN established the award which bears his name in an effort to increase the recognition of the importance of medical programs in industry, to promote the human touch in the medical care of workers. His biographer, Beasley, said of Knudsen, 'He was a dominant factor in establishing plans for better employee relations within the corporation.' In its 1939 Annual Report the General Motors Income Security Plan and Employee Benefits Plan were described. A. H. ALLEN in an obituary note said, "KNUDSEN knew the working man and his problems intimately and was inclined to brush aside the stuffiness of some top corporation brass.'

"He believed in the sanctity of the individual. KNUDSEN'S understanding of men as well as of production is well demonstrated in some of his recorded utterances. He has been quoted as saying, 'No attempt should be made to influence the private lives of employees.' He showed an ability to get along with people, to bring out in them the best of their abilities.

"May we who have the duty and the privilege of serving our fellowmen through occupational health programs never cease in our efforts, never lose the fun of trying to serve more effectively."

Health Achievement

The Health Achievement in Industry Award is the recognition accorded an industrial organization for the development and improvement of medical service, with particular emphasis on advances made within the past year. This Award was first presented in 1949 to the Rome Cable Company of Rome, N.Y., and has been presented annually since that time. The 1959 Award to the Kaiser Steel Corporation was presented by RICHARD A.

SUTTER, M.D., and received by HENRY J. KAISER, JR. Part of DR. SUTTER'S presentation remarks follow:

"Factors considered in determining the winner of the Award are: (1) philosophy and attitude of management in regard to the company medical program; (2) physical examinations and placement policies; (3) treatment, rehabilitation, and preventive medical programs; (4) professional qualifications of the medical staff; (5) equipment and facilities; (6) industrial hygiene; (7) effectiveness of the medical program in community relations. Many programs were reviewed, but one stood out above others.

"Quoting DR. CLIFFORD H. KEENE, Director of Medical Relations for the Henry J. Kaiser Company: 'Although Kaiser Steel is the largest independent steel producer in the West, it had no independent medical program of consequence up to 1956. The first step in rectifying this situation was in obtaining DR. HALLETT LEWIS to act as Medical Director.'

"The major portion of Kaiser Steel Corporation is located at the Fontana, California, Works, which employs about 8,000 people. Construction of a $250,000 medical installation covering 6,000 square feet was only finished this year. It is noted that this industrial medical facility is completely independent of the Kaiser Permanente Foundation.

"I wish time permitted me to read you detailed reports from our inspection team who gave so generously of their time in evaluating the Kaiser Steel Company medical program at Fontana. Among comments are many such as these: 'They have developed an extremely fine preventive medical program from extremely primitive beginnings. . . . The relationship with supervisors and workers is a warm and close one, indicating acceptance. . . . They have achieved highest preventive health measures by the cooperation of an enlightened management and a top-flight medical department.'

Henry J. Kaiser, Jr. (left), accepting the Health Achievement in Industry Award on behalf of the Kaiser Steel Corporation. Dr. Richard A. Sutter presents the plaque.

"In the words of the Medical Department of Kaiser Steel, the three basic objectives of the Fontana program are: (1) to provide the best possible treatment for occupational injury and illness; (2) to contribute substantially to the prevention of occupational injury and illness; and (3) to help employees achieve the highest level of personal health.

The Health Achievement in Industry Award Committee feels the Kaiser Steel Company Fontana Works is fulfilling its stated objective in an exceptional manner, and in recognition thereof takes pleasure in awarding it the Health Achievement in Industry Award, for 1959.

In MR. KAISER'S acceptance speech, he said:

"I am proud to be able to accept this Award for Health Achievement, on behalf of the company that earned it—Kaiser Steel Corporation—and on behalf of our medical officers, DR. HAL LEWIS, Medical Director for Kaiser Steel Corporation and DR. CLIFFORD KEENE, Director of Medical Relations for the Kaiser Companies.

"Kaiser Steel Corporation's health program is a very young program. We've come a long way in a short time and still have a long way to go. We feel honored, therefore, to be associated with such great practitioners of industrial health as Inland Steel Corporation, Ford Motor Company, Humble Oil Company and all the others. The examples and trail-blazing which these fine firms and their medical directors have brought about, have helped us immeasurably in developing our own program.

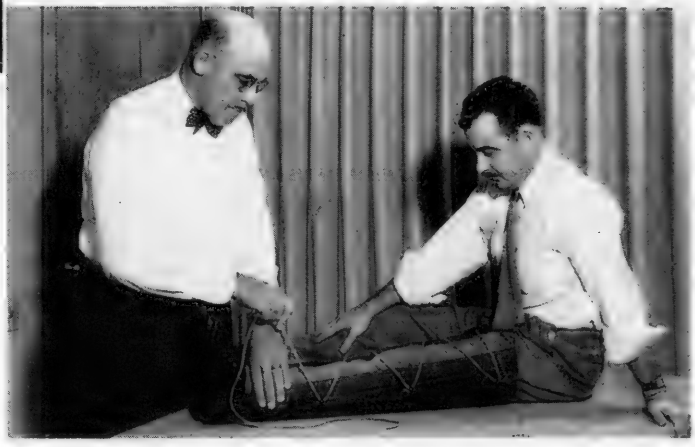
"Our philosophy at Kaiser with regard to industrial health is a simple one. A business is made up of people. And people are important. People have value. We care about them — not as they appear in the mass, but as individuals. These people work *with* us—not for us. They operate our machines—they work in our mines—they leave their families and enter a new and different environment. We are responsible therefore, for their welfare, and we are bending every effort toward creating an environment suitable to their emotional and physical capacities. This concern for the individual, indeed, is the bedrock upon which this nation is founded. We protect the individual's rights, we safeguard his right to free speech and we concern ourselves with his welfare. We do this not in the sense of paternalism — but because it is our responsibility and our desire.

"There is a selfish reason of course, in setting up such a health program—a dollars and cents reason. An old cliche has it that a sound industrial health system is one way to reduce

. . . SPLINT THEM WHERE THEY LIE WITH

the All-Purpose timmins EMERGENCY splint

- Complete immobilization
- Useful for any fracture
- Reduces shock and transport injury
- Easily used anywhere—by anyone
- Sturdy, light, compact



Timmins splints are made of heavy duty canvas with reinforced steel hook fasteners, rawhide lashings, and strong bracing slats. The slats are removable to allow laundering the canvas. The complete Splint kit is compact and lightweight—measures only 30″ x 4½″, weighs just over 3 lbs.

TIMMINS ARM SPLINT, LEG SPLINT AND CARRYING CASE . . .

$19.50

The Timmins all-purpose emergency splints provide easy, safe, fast handling of all types of fractures, sprains, or other injuries. The tapered design, and loop-over lacing give snug, rigid support for the injured limb or other member. The arm and leg units are adjustable to either adult or child. Leg unit will give full length support to injured back or neck.

Manufactured by the Timmins Splint Company, Omaha, Nebraska

Order from Karel First Aid Supply Company—for over 29 years leaders in industrial medical supplies and equipment.

Distributed by Karel **First Aid Supply Company**

4342 OGDEN AVE. CHICAGO 23, ILL.

costs. This old cliche has been proven out at Kaiser Steel, I am happy to say. A sound medical program—and by sound I mean *thorough*—also enables us to sleep just a little bit better because we know that we are caring for our people on the job, the way we should be.

"CLIFF KEENE, in another of his many wise moves, chose a young doctor named HAL LEWIS, to head the program and make it work. On our part, we were determined to give HAL as much freedom as possible, to work out the details. Our experience has shown that the right man always rises to this challenge of independence, and because he *is* challenged, he comes up with a *real* contribution.

"Again, my sincere thanks, on behalf of the men and women of Kaiser Steel Corporation for this great and wonderful honor. God bless everyone of you, for what you are doing, to help make this partnership between the Medical Profession and American Industry, a successful one."

Merit in Authorship

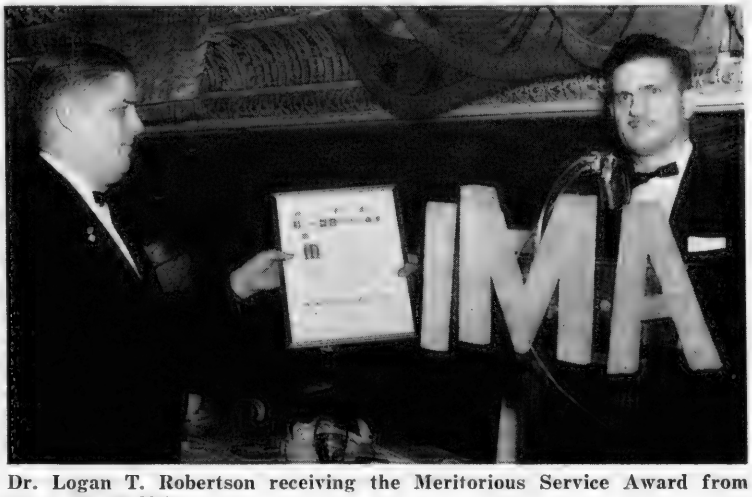
The Merit in Authorship Award Committee of the Industrial Medical Association annually reviews the literature in the field of industrial medicine for the preceding calendar year to select the published work that is most outstanding from the points of view of originality, scientific merit, clarity of presentation, and significant contribution to industrial medicine. In presenting the awards for 1958, RALPH F. SCHNEIDER, M.D., said:

"I am very proud to announce, on the part of the committee, that the 1958 Merit in Authorship Award of the Industrial Medical Association goes to DR. WILLIAM J. FULTON, recently retired from the General Motors Corporation, for his excellent publication on 'Medical Department Layout and Design' which appeared in four sections in *Industrial Medicine and Surgery*.

"In addition, the Merit in Authorship Award Committee has the pleasure to commend for honorable mention in the year 1958, the following: DRS. C. A. D'ALONZO and SIDNEY PELL of the E. I. du Pont de Nemours Company, for their article: 'Myocardial Infarction in a One-Year Industrial Study' which was published in the *Journal of the American Medical Association;* and DR. NORBERT J. ROBERTS of Standard Oil Company (New Jersey) for his article: 'The Periodic Evaluation of Health' which was published in *The Medical Bulletin* of Standard Oil Company (N.J.).

"Gentlemen, the stature of the specialty 'occupational medicine' has been significantly raised in the eyes of your professional colleagues by your fine work. Congratulations!"

Dr. Ralph F. Schneider presenting the Merit in Authorship Award to Dr. William J. Fulton.



Dr. Logan T. Robertson receiving the Meritorious Service Award from Dr. J. H. Wolfsie.

Meritorious Service

The Meritorious Service Award is presented each year to a member or fellow of the Industrial Medical Association (other than a member of the Executive Committee or Board of Directors during his term of office) who has made an outstanding contribution to the Association, beyond what might normally be expected. J. H. WOLFSIE, M.D., presented the Award to LOGAN T. ROBERTSON,

M.D., with the following comments:

"Among the numerous sincere workers and diligent contributors to the successful operation of the Industrial Medical Association this past year, one member is conspicuously deservant of this recognition. Therefore, as Chairman of the Meritorious Service Award Committee, it is my privilege and pleasure to ask DR. LOGAN T. ROBERTSON to come forward to accept this award in grateful recognition of his devoted and conscientious service to the Industrial Medical Association.

"DR. ROBERTSON became a member of the Association in 1951, a fellow in 1958, was District Counselor in charge of District 6 from 1956 to 1958, and is currently Chairman of the Small Plant Services Committee and Chairman of the special Membership Drive Committee. Particular attention is called to his sincere acceptance of the responsibilities of his committee assignments in which he has contributed an outstanding effort with effective returns."

Newly Appointed Asst. Managing Director

RITA KIRTLEY PACKER has been associated with the headquarters office of the Industrial Medical Association since 1948, and over the past 11 years, the men who have served as officers and directors of the Association have come to depend more and more on her for an increasing number of duties and responsibilities. They have come to know her personally through her unfailing attendance at the executive sessions, often held on weekends and after normal working hours. Throughout, she has gained the respect and admiration of many members as well as the executives of the Association. In acknowledgement of the importance of the position she holds in the IMA, the board of directors appointed her Assistant Managing Director at the meeting held during the Industrial Health Conference in April. Her title had been Executive Secretary since 1955.

New Managing Director Has Varied Background in Occupational Health and Safety

CLARK D. BRIDGES, new Managing Director of the Industrial Medical Association was picked by the Board of Directors a year and a half ago for the newly created position of Assistant Managing Director. From the beginning, it was apparent that his rich background of experience in all major phases of occupational health and safety, coupled with his innate executive ability to accomplish results with efficiency and dispatch, marked him as the man to become the Association's next Managing Director. This came about on May 1, upon the retirement of DR. EDWARD C. HOLMBLAD.

Well known among the IMA membership for many years, MR. BRIDGES came to the Association from the American Medical Association, where he was Assistant Secretary of the Council on Industrial Health, a position he assumed in 1954. Later he served as Acting Secretary following the death of DR. CARL M. PETERSON in 1955. In this capacity he served as secretary to several committees concerned with various phases of industrial health.

MR. BRIDGES' entire career has been devoted to manpower conservation and the prevention of disability. He was Consultant on Health, Safety and Workmen's Compensation to the Illinois Manufacturing Association during the period that occupational disease and health and safety legislation was at its peak. During World War II he served the National Safety Council as staff industrial hygienist. At this time he was also an instructor and course supervisor in safety engineering and industrial hygiene with the Illinois Institute of Technology.

Following this, he devoted 10 years to the management of safety engineering, industrial hygiene and health and safety education programs for the Zurich American Insurance Companies. During this period, he wrote "Job Placement of the Physically Handicapped" published in 1946 by McGraw-Hill Book Company. Although now out of print, it is still regarded as the standard reference on basic techniques for matching disabled workers to suitable jobs with maximum effectiveness.

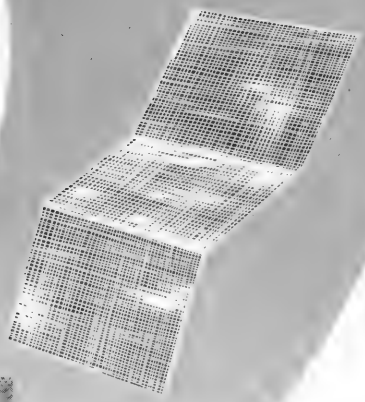
Clark D. Bridges

MR. BRIDGES is a charter member of the American Industrial Hygiene Association and was the first president of its Chicago chapter; a member of the American Society of Safety Engineers and the American Public Health Association. He is also a member of the President's Committee on Employment of the Physically Handicapped, and several of its subcommittees; and a consultant to the President's Conference on Occupational Safety, and member of the Industrial Conference of the National Safety Council.

IMA Appoints New Exhibit Manager

WILLIAM J. BURNS, of Lansing, Michigan, has been named to handle the technical exhibits for the Industrial Health Conference. MR. BURNS is one of the outstanding men in the Medical convention field, and is a Director of the Professional Convention Management Association. His reputation for successful exhibit management is well known to many members of the Association.

The NEW DUAL PURPOSE



VASELINE
PETROLATUM GAUZE U. S. P.
STERILE
3 x 3 PAD, opens to 3 x 9 INCHES
UNOPENED ENVELOPE MAY BE AUTOCLAVED OR COLD-SOAKED
TEAR HERE

3″ x 9″ STRIP

Shorter length ends waste on small area wounds. New Z-fold insures perfect graft takes. Guaranteed sterile at time of use.

3″ x 3″ PAD

Three-ply, fine-mesh gauze, lightly impregnated — for use in physician's office, industrial medical department, first aid.

6th SIZE of VASELINE® PETROLATUM GAUZE

Now supplied in:	1/2″x 72″	3″x 18″
	1″x 36″	3″x 36″
	3″x 3″/ 3″x 9″	6″x 36″

Sole Maker:

CHESEBROUGH-POND'S INC.
Professional Products Division
New York 17, N. Y.

VASELINE *is a registered trademark of Chesebrough-Pond's Inc.*

Journal of Occupational Medicine

SCURVY as an Occupational Disease

The Sappington Memorial Lecture

Carey P. McCord, M.D., Ann Arbor, Michigan

RUNNING through Maeterlinck's "The Blue Bird" one happy concept is that those who no longer are living temporarily are restored to life whenever the rest of us talk about them, think of them, or write about them. If that be true, Dr. Clarence Sappington is much alive throughout the years, and this yearly memorial lecture becomes only the focal point for a never-ending flow of memories. Throughout the year many are the persons who recall Dr. Sappington, the author, the editor, the court witness, the investigator, the physician, or the good friend. Toward keeping his altar flame glowing, I appreciate this opportunity to bring my own offering.

A currently popular piece of music centers upon a juggler who, having no other offering to place before the altar of his God, stands there and performs his juggling tricks. The outraged populace about to tear him limb from limb for his sacrilege is stayed by the appearance of an angel who blesses the juggler for having brought all that he had to offer and admonishes the populace against doing him any harm.

Dr. McCord is Editor, *Industrial Medicine and Surgery*, and is associated with the Institute of Industrial Health, University of Michigan.

At this moment my position is similar. All that I may lay on this altar of the Sappington Memorial is some contribution from my own wares. However, it is not expectable that any angel here will appear blessing this lecturer or admonishing this audience not to assail the speaker.

This offering derives from some years of exploration of the disease scurvy, or scorbutus, in its occurrence as an occupational disease. In no bold fashion has scurvy, the great ravager, even been labeled with its best deserved appellation—history's foremost occupational disease. The explorers of occupational diseases, not entirely oblivious to disease history, have failed in adequate recognition that the one disease that exacted the greatest toll in human life is scurvy.

Just as the historians of occupational diseases may be chided for not discovering "scurvy," so the historians of scurvy, of whom there is no dearth, and among whom there is no lack of ability, may be chided for not discovering "occupation." In those fascinating but well-documented narratives of the havoc of scurvy, their authors ever are on the verge of saying "occupational." Always there are implications. The modern writer, Capt. L. H. Roddis, terms

scurvy "the principal killer of sailors." Not until the time of the bicentennial (1953) of James Lind's "A Treatise of Scurvy" (published in 1753) did an author apply the unvarnished, unhedged words "occupational hazard."

Scurvy becomes an occupational disease only when those exposed have, in some manner, become a captive work force. Quickly it will be apparent that a ship's crew is a captive work force and was far more so in olden times. Beyond debate, a disciplined army is captive as to food supplies. In some industries, notably in Southern Africa, workers are kept in compounds with scant access to any outer environment. Isolated labor camps long characterized much of the transcontinental railways. Prisoners of war perforce are captive. Ordinary prisons and mental hospitals the world over, wherein scurvy has on occasion been rampant, scarcely may be regarded as harboring a work force as far as inmates are concerned so that those loci of scurvy are not embraced.

Without effort it has become possible to accumulate records of no fewer than 2,000,000 deaths from scurvy in captive work forces. The major period of outstanding disasters is during the three hundred years from 1500 to 1800. The British navy appears to be the greatest contributor of occupational scurvy, but this appearance may be deceptive. No other nation has so well recorded its epidemics and catastrophies. Other navies may escape condemnation merely because of the absence of conviction by their own records.

Scurvy as it occurs as an occupational disease is the same scurvy that besets others in perhaps even larger number apart from occupation. Yet, for a century it was contended that there existed "sea scurvy" and "land scurvy" and that the two conditions were dissimilar. That notion did not prevail.

In support of this thesis of occupational scurvy, it is my purpose here to present a single episode that readily serves as a prototype or archetype of many hundreds of others, all characterized by the miseries of scurvy. This one episode is the best known of all and is the first chronicled record of scurvy at sea. This is the story of Vasco da Gama, his fleet and his sailors:

The voyage of Vasco da Gama, a Portuguese from the town of Sines, midway between Lisbon and Cape St. Vincent on the Atlantic Ocean, in 1497-1499, has been made the dolorous symbol of all time as to scurvy at sea. It has been immortalized by Luiz de Camões (1524-1580), the great Portuguese poet, in "The Luisiads." In the fifth canto de Camões writes of scurvy's havoc among mariners of da Gama's vessels:

A dread disease its rankling horrors shed,
And death's dire ravage through mine army spread,
Never mine eyes such dreary sight beheld,
Ghastly the mouths and gums enormous swelled
And instant, putrid like a dead man's wound,
Poisoned with fetid streams the air around,
No sage physician's ever watchful zeal,
No skillful surgeon's gentle hand to heal
Were found: each dreary mournful hour we gave
Some brave companion to a foreign grave.

Although every full portrayal of scurvy as a part of sea history includes the da Gama journey, few persons are aware of the stark discrepancies and uncertainties about this travel. There are no firsthand accounts of this first trip from Europe to India by sea, and the subsequent reportings chiefly are distinguished by disagreement. There are records of purported conversations between His Majesty, the King, and Vasco da Gama in detail, but the important items of how many ships, how large the crew, the total number of deaths, and the total number of deaths from scurvy constitute a jumble of conflict. The purposes of this account of scurvy are equally well served whether the number of deaths was 55 or 200, or the crew 148 or 370, as conflictingly stated.

Vasco da Gama sailed from Lisbon on July 8, 1497, with four ships especially constructed for the purpose. Christopher Columbus had startled all of Europe five years earlier by his discovery of what proved to be America. Five years before Columbus, Bartholomew Dias, another Portuguese, had completed the world's first great navigation. He rounded the Cape of Good Hope and provided the prospect of sea travel to India. Columbus' journey was attended by no scurvy, for his passage time was within the critical time period of three months necessary for scurvy development. It is probable that scurvy attacked the Dias party, but the records are fragmentary.

The da Gama objective was India, and India was reached but only grievously. This little fleet prided itself as being superbly equipped. There was a triple supply of everything seemingly required for a long voyage. Everything except that most needed supply of foods that would have averted scurvy. Everything was planned except for those foods that later made it possible for the historian to write with some poetic license that every mile of travel could have been marked by some floating gravestone of a sailor dead of scurvy. There were no medical agents except those for the personal use of some of the officers. Castanheda, according to Hakluyt, listed provisions taken on the voyage "calculated to suffice for three years." Daily rations in the amount of "1½ pounds of biscuit, 1 pound of beef or half a pound of pork, 2½

pints of water, 1¼ pints of wine, one-third of a gill of vinegar, and half that quantity of oil." On fast days, half a pound of rice, of codfish, or cheese was substituted for the meat. There were, in addition, flour, lentils, sardines, plums, almonds, onions, garlic, mustard, salt, sugar, and honey.

With the exception of the dried plums and onions in short supply, a better lot of food conducive to scurvy not well could have been assembled. Yet, these were the ship victuals characteristic of the period and for scores of years before and after. Earlier no scurvy had appeared, but a big difference is manifest. Before, there had been no long navigations. Prior to Dias, Columbus, and da Gama, the world's sailors had been "shore clingers" and "island hoppers."

Four months later (Nov. 7, 1497) the Bay of St. Helena off the western coast of Africa had been reached, and some fresh food may have been obtained. At that time, all was well as to scurvy. None had appeared and none was expected, since neither the disease itself nor any name for it was known. The end of November marked the arrival of this little fleet at the Cape of Good Hope, and by Christmas what is now Natal was sighted (the Day of the Nativity provided the name "Natal").

By January of 1498, six months away from Portugal, real trouble appeared in the form of a mysterious disease. To the da Gama party this disease had no name, no known cause, and no cure. In retrospect manifestly this disease was scurvy fully attributable to vitamin C deficiency and all springing from the quality of food supplied on board ship. The fact that scurvy was late in appearance was due to the landings earlier made here and there during which fresh foods were obtained.

The January episode is so vivid that it is best presented in the language of an early chronicler:

In January 1498, "they ran close to the land. . . . Proceeding in this way, one day they found themselves at dawn in the mouth of a large river, into which the captain-major entered, for he always went first; and all entered, and found within a large bay sheltered from all winds, in which they anchored, and all exclaimed three times—'The mercy of the Lord God' for which reason they gave this river the name of the River of Mercy. Here they soon caught much good fish, with which the sick improved, as it was fresh food, and the water of the river was very good. Now, at this time, in all the ships there were not more than a hundred and fifty men, for all the rest had died." Commenting further on this stay at the River of Mercy, the same source observes: "and the principal ailment was that their gums swelled and rotted, so that their teeth fell out, and there was such a foul smell from the mouth that no one could endure it. The captain-major provided a remedy for this, for he ordered that each one should wash his mouth with his own water each time that he passed it, by doing which in a few days they obtained health." The editor notes that Barros says of this illness: "The greater part of the sickness was erysipelas, and the so great growth of the flesh of their gums, that it would hardly be contained in the men's mouths, and as it grew it rotted, and they cut into it like into dead flesh: a very pitiable thing to see; which sickness they afterwards came to know proceeded from the salt meat and fish, and biscuit spoiled by long time." The editor observes, "This is probably the first occurrence or mention of scurvy at sea."

This evil disease continued to plague these travelers. By the end of February of 1498, one ship had been lost and all the others sadly needed repair. Every activity was hampered by a sick crew, many of whom were ill, with their feet and hands swollen and their gums growing out over their teeth so that they could not eat.

It is notable that wherever scurvy is mentioned nearly always this is in connection with some landing. This observation has been made many times. Dr. Lorenz, in his accounts of scurvy among California's gold rush forty-niners, noted that on landing from ships in San Francisco Bay there were no porters, no drays, and no cartage service. Every man lugged his chest or trunk a few blocks or a few miles to the nearest available hotel. Men with incipient scurvy on ship had escaped any direful effects, but promptly on landing, incipient scurvy became malignant scurvy.

Evils multiplied, misery was compounded, the unknown disease worsened. Here and there was a boon. On April 7 (1498) the woebegone travelers cast anchor off Mombaca on the Eastern coast of Africa. There were many small craft in the harbor, all of which were decorated on the arrival of the strange newcomers. Not to be outdone, the Portuguese decorated their own vessels as best they might with a crew well limited by previous deaths while the few survivors greviously were ill. The next day, the king of Mombaca sent da Gama a large supply of oranges and lemons along with other gifts. This food supply was not designed as any cure or treatment for the strange malady. In truth, the presence of any illness was not divulged to the natives. The beneficent gift purely was incidental. Yet, in a few days all the sick had re-

covered. This miraculous event was attributed to the salubrious air of that vicinity. This use of citrous fruits in scurvy is one of the first on record, but this was an unplanned use and the virtues of these fruits went unrecognized.

With a now hearty but skeleton crew, da Gama sailed across the Indian Ocean. Twenty-three days later, on May 22, he arrived in Calicut (not Calcutta) on the Malabar coast.

India had been reached. The long and grievious "out" journey was over. A sea tie bound Europe to the Orient. A new world of trade lay in sight. History had been made. Yet, the return journey must be made. That westward travel was replete with its own misfortunes, even more disastrous.

Da Gama remained in India until the autumn of that year (1498). The treacherous portion of the return trip proved to lie in the Arabian Sea. There three months (Oct. 5, 1498-Jan. 2, 1499) were spent in either becalmed seas or coping with adverse winds. During this period 30 additional deaths from scurvy are recorded. On each ship there were only seven or eight men able to take a hand in the ship's navigation. These few were far from sound. When the vessels arrived at Milindy on Jan. 7, 1499, da Gama's early act was to send a sailor ashore seeking a supply of oranges. By that time seemingly something had been learned about the virtues of citrous juices. Despite this, there were many deaths among these seafarers in this port at this time.

The city of Angra was reached by August, 1499. Angra was the former capital of the Azores. Thus the adventurers were close to home. The misadventures continued. Paulo da Gama, Vasco's brother and the captain of one of the crafts, long ailing, died after one day ashore in Angra. Paulo was buried with high distinction in the Monastery of St. Francis. Some other deaths occurred there among the lowly seamen, almost in sight of their goals and the rewards promised them.

This battered remnant of men sailing in vessels that daily threatened to sink arrived at Lisbon on Sept. 18, 1499. This fateful voyage lasted 32 months. Da Gama had lost his crew. In the throes of uncertainty the most acceptable estimate is that 100 of the total complement of 160 died of scurvy. One Portuguese historian writes of this horror: "If the dead who had been thrown overboard between the coast of Guinea and the Cape of Good Hope, and between the Cape and Mozambique, could have tombstones placed for them each on the spot where he sank, the whole way would appear one continued cemetery." Yet, world history had been made. Medical history as well had been made, since scurvy, a mysterious and then still unnamed disease, had been established as the "scourge of sailors."

So much for Vasco da Gama and his doleful adventure. The hope is that the claim that scurvy is the world's foremost occupational disease is here accepted. To many, the important inquiry will be, "Is scurvy all history?" The reply must be that occupational scurvy is at present time almost unheard of but nonoccupational scurvy, or at least vitamin C deficiency, may be detected in almost any community. Even occupational scurvy has not entirely been banished. Two summers ago a strange disease appeared in some uranium prospectors in Canada. One hundred years earlier, any physician promptly would have made a diagnosis of scurvy. Yet, in its occurrence two summers ago that malady long went unrecognized.

By design this Sappington Memorial Lecture has been built around the da Gama catastrophies. Equal conviction could have been provided by the disasters of scurvy in armies beginning, as to well documented records, with the crusades and continuing into World War II. Notably the armies of the United States on the conquest of our West grievously were affronted with scurvy. Or, instead, the election might have been made from the scores of disasters among the polar explorers, whether arctic or antarctic and whether by land or by sea. Proof of the occupational nature of some scurvy readily is to be found in overwhelming volume among the early generations of the merchant mariners. The history of the East India Company and the Hudson Bay Company is pockmarked with the tragedies of scurvy. Were we not already surfeited with evidence, this lecture might have had its focus in scurvy in the nefarious slave trade from Africa, or among the whalers, or among the American colonists, or in penal colonies, or among the Mormons in their travels, or among the gold rushers of 1849 or their later counterparts in the Klondike. Always the disease was the same; ever the cause was the same; endlessly the havoc was the same. The only variable was the setting.

However varied the settings may have been, and these settings are legion, and whatever the number of major disasters, and they are to be reckoned by the hundreds, evidence is teeming that this destructive disease often has appeared under circumstances of work warranting acceptance as an occupational affection. It is the purpose of this presentation to label scurvy as history's foremost occupational disease.

Dr. McCord's address is 1313 East Ann St., Ann Arbor, Michigan.

An Immunological Approach to Silicosis

E. C. Vigliani and B. Pernis, Milan, Italy

THE SILICOTIC nodule, with its hyaline core, is the typical morphological feature of silicosis. It regularly follows the introduction into the tissues of crystalline silica, but we must confess that we do not know much concerning the mechanism of the pathogenic action of silica itself. In fact it is difficult to explain the complex pathological process which leads to the formation of a hyaline nodule with its cellular halo, simply by focusing the attention on the small amounts of silicic acid which may dissolve in vivo from quartz[1] or on a supposed direct action of the crystalline surface on tissue proteins.[2,3] Moreover, many valid objections[4,5] may be advanced against both the "solubility" and the "surface" theories of silicosis in their different present forms.

We have tried to consider the pathogenesis of silicosis not merely as a chemical, physical, mineralogical, or morphological problem, but as a complex pathological situation needing to be studied by means of a wider biological approach. In the end, this biological approach has turned out to be an immunological approach, as will be shown in the present paper.

In 1949 Vigliani, Boselli and Pecchiai[6] observed that the sera of most, if not all, silicotic patients showed a definite increase of gammaglobulins. This increase appeared to be somehow connected with an increased proliferation of hystiocytes and plasmacytes, which, as appeared from the histological study of some cases of severe silicosis, was not confined to the lungs and the regional lymph nodes, but was to be found throughout the entire organism. The histological observations made by Pecchiai[7] in our Institute supported, moreover, the possibility that the hyaline substance of the silicotic nodule was due not to an alteration of the collagen fibers but, instead, to the precipitation onto them of an amorphous protein.

The authors are from the Institute of Occupational Health of the University of Milan (Italy).

This work was supported by a grant from the European Community for Coal and Steel.

Chemical Composition of Silicotic Hyaline Tissue

Chemical analyses showed that the hyaline substance was composed of proteins (about 80%), lipids (about 17%), and carbohydrates (about 3%). The amino acid composition of the proteins was studied,[8,9] and the results supported the possibility that only about 40% of these (proteins) was due to collagen, the remaining 60% being due to proteins similar, in this respect, to the beta or gamma serum globulins. It may be recollected that King and coworkers[10] have also found no more than 40% collagen in the hyaline tissue of experimental silicosis. The presence in the silicotic hyaline of comparatively high amounts of globulins rich in aromatic amino acids was also confirmed by ultraviolet spectrophotometry.[11]

The chemical study of the lipids[12] which are found in rather high amounts in the silicotic hyaline showed the presence of free and esterefied cholesterol, phospholipids, cerebrosides, fatty acids, and neutral fats. The small but interesting carbohydrate fraction is due[13] to hexoses, methylpentoses, and hexosamines; with the carbozole method of Dische no hexuronic acids could be shown. This means that the silicotic hyaline does not include significant amounts of acid mucopolysaccharides.

Electron Microscopy of Silicotic Hyaline Tissue

The presence of abundant noncollagenous material in the silicotic hyaline tissue is confirmed by electron microscopic observations[14] made after sonic disintegration of human silicotic nodules. The collagen fibers then appear embedded in and masked by an amorphous and seemingly homogeneous substance (Fig. 1) which can be completely removed by digestion with crystalline trypsin (Fig. 2); and the submicroscopic aspects of the fibers can then be observed in detail and do not differ from those of normal collagen protofibrils. If, on the contrary, collagen is extracted by autoclaving from the silicotic hyaline, the insoluble residue ap-

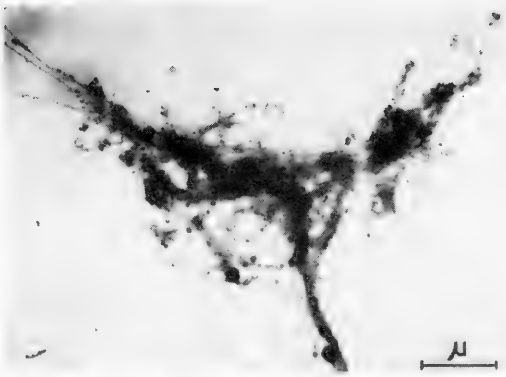


Fig. 1—Hyaline of human silicotic nodule after sonic disintegration; collagen fibrils are covered with abundant amorphous substance.

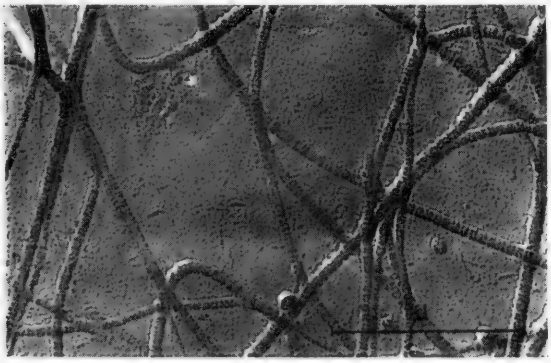


Fig. 2—Thin collagen fibers of human silicotic nodule; the amorphous substance has been digested with crystalline trypsin.

pears amorphous by electron microscopy (Fig. 3). The submicroscopic structure of the silicotic hyaline is therefore different from that of other collagenous tissues such as Achilles tendon or simple scar fibrous tissue, the difference being due mainly to the abundance of the amorphous component as compared with the fibers in the silicotic hyaline.

We wish to point out that the aforementioned chemical investigations show that this amorphous substance is not merely a consequence of an increase of the normal ground substance but is due mainly to components not normally present in the solid state in connective tissues, namely plasma globulins.

Immunological Analysis of the Silicotic Hyaline Tissue

The presence of plasma globulins could be definitely established with immunological investigation. Homogenates of silicotic hyalines as well as homogenates of normal lung, were washed many times in order to free them completely from serum or lymph and were then subjected to the following procedures[15,16]:

1. Titration of Antibodies Produced by Rabbits Immunized with Human Silicotic Hyaline—Five rabbits were immunized with repeated intravenous injections of a suspension of very finely divided and thoroughly washed silicotic hyaline tissue from human lungs. After four weeks all five rabbits gave anti-human-gamma-globulin antisera of good titer; indeed, these antisera could well be used as Coombs sera.

2. Absorption of Antibodies from an Anti-Human Antiserum by a Homogenate of Silicotic Hyaline—One milliliter of rabbit anti-human antiserum (containing antibodies against 14 different proteins of normal human serum) was absorbed with 0.3 ml of a finely divided and thoroughly washed homogenate of human silicotic hyaline. The antibodies which remained in the absorbed antiserum were tested with use of the immunoelectrophoretic technique of Grabar and Williams[17] with whole normal human serum used as antigen(s). It could thus be ascertained that absorption with silicotic hyaline results in the *selective* removal of antigamma antibodies from an anti-human-serum antiserum. This result is reproduced easily with different samples of silicotic hyaline and has been recently confirmed by Licht.[18] On the contrary, no absorption of antibodies from an anti-human-serum antiserum could be obtained with washed homogenates of normal human lungs.

3. Anti-Gamma-Globulin Consumption Test with Homogenates of Silicotic Hyaline—The anti-gamma-globulin titer of a Coombs serum was determined before and after absorption with silicotic hyaline tissue, normal and tuberculotic human lung, and various samples of amyloid and fibrinoid. The Table shows the extremely high consumption of anti-gamma antibodies by all samples of silicotic hyaline.

In conclusion, all immunological data indicate that the noncollagenous proteins of silicotic hyaline are mainly gamma globulins.

The Silicotic Hyaline Substance as a Result of an Antigen-Antibody Precipitation

As it is well known that antibodies are usually gamma globulins, it is reasonable to

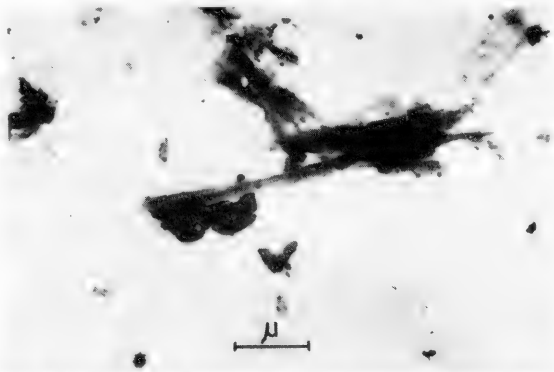


Fig. 3—Hyaline of human silicotic nodule after autoclaving and sonic disintegration; collagen fibrils have disappeared, leaving envelopes of amorphous substance.

*Consumption Test of Anti-Human-Gamma-Globulin Antibodies**

Absorbed (0-5 gm/ml) with	Dilutions									
	1:8	1:16	1:32	1:64	1:128	1:256	1:512	1:1024	1:2048	1:4096
Nonsensitized red cells	5†	5†	5†	5†	5†	5†	4†	3†	2†	2†
Rh-sensitized cells	5	5	5	4	4	3	2	1	0	0
1 Normal lung	5	5	5	4	3	3	2	1	0	0
2 Normal lung	5	5	5	5	5	5	4	3	2	1
3 Normal lung	5	5	5	5	5	5	4	2	1	0
1 Hyaline silicotic tissue	3	2	1	0	0	0	0	0	0	0
2 Hyaline silicotic tissue	1	0	0	0	0	0	0	0	0	0
3 Hyaline silicotic tissue	3	3	1	0	0	0	0	0	0	0
4 Hyaline silicotic tissue	1	0	0	0	0	0	0	0	0	0
5 Hyaline silicotic tissue	5	4	1	0	0	0	0	0	0	0
Amyloid	5	5	5	5	5	5	4	3	1	0
1 Lupus fibrinoid	5	5	5	5	5	3	1	0	0	0
2 Lupus fibrinoid	5	5	5	5	4	2	0	0	0	0
Tuberculous scar tissue	5	5	5	5	5	5	5	2	1	0
Tuberculous granulation tissue	5	5	5	5	5	3	2	1	0	0

*The antiglobulin serum is titrated against Rh-positive red cells, strongly sensitized with an incomplete anti-D serum. Red cells (normal and D-sensitized), homogenates of normal lung and of silicotic nodules, amyloid, fibrinoid, and tuberculous tissue, were washed ten times before being used for absorption.

†5,4,3,2,1 = Decreasing degrees of agglutination; 0 = no agglutination.

assume that an immunological process (antigen-antibody precipitation) plays a role in the genesis of the silicotic hyaline tissue. This assumption is supported by the following facts:

1. There are chemical and immunological similarities between the silicotic hyaline and some fibrinoids as those which have been observed[19, 20] in cases of lupus erythematosus, acute or chronic rheumatic disease, or serum illness, whose immunological origin is generally agreed on.

2. There is at least one proved example which shows that antigen-antibody precipitates formed in vivo in the interstitial spaces have a tendency to be absorbed by newly formed collagen fibers: this is given by an observation of White, Coons, and Connolly[21] who have seen that at the periphery of the granuloma experimentally induced by the injection of antigens adsorbed on aluminum phosphate "a surprising finding was the localization of a fluorescence characteristic for antibody on the surface of the collagen fibers which enclosed the granuloma at the site of injection. This staining was first faintly visible at 2 weeks after injection but became much more intense at 3 weeks and later. . . . This staining of collagen fibers was confined to the immediate neighborhood of the local nodule and decreased peripherally, so that collagen of the normal dermis at the edge of the section was unstained."

It appears probable that a similar phenomenon may account for the adsorption of the hyaline substance (gamma globulins) on the collagen fibers of the silicotic nodule.

Morphological Aspects of the Immunological Reactions in Silicosis

The concept of an immunological origin of the silicotic nodule is supported by a whole series of histological observations which have been performed by us, working in collaboration with the Institute of Pathology of the University of Turin. These observations, which concern mainly the cytological aspects of experimental silicosis, are very relevant to the immunological approach to silicosis, and we must review them here in some detail.

A rapidly developing silicosis (generalized or localized) was obtained in experimental animals (rats, mice, and rabbits) by means of intravenous, subcutaneous, or intratracheal injections of very active dusts, such as tridymite or HF-etched quartz. The cellular reactions to these procedures may be summarized as follows: The macrophages which have phagocytosed the dust particles collect in small clusters and, sooner or later, undergo regressive changes ultimately leading to complete destruction. After the onset of the regressive changes, the macrophages are surrounded by a large halo of histiocytes and immature plasma cells; later these develop into mature plasma cells, and fibroblasts, and mast cells (in various

stages of degranulation) also appear. This condition is shown in Figure 5*c*.

The precipitation of the hyaline substance (gamma globulins) onto the newly formed reticular fibers begins only after the appearance of plasma cells. These, together with mast cells in variable number, persist for many months among the cells of the outer shell of the growing silicotic nodule.

An extraordinary increase of immature and mature plasma cells is also regularly observed in the lymph nodes which drain the lymph from the organs where a silicotic process is developing, and, to a lesser extent, in the bone marrow, the spleen, etc. If sterile quartz is injected into the footpad of a rabbit, the local reaction will be mainly limited to the appearance of a cluster of macrophages, with few, if any, plasma cells and absence of hyalinosis; but in the regional (popliteal) lymph node a very marked plasma cell reaction followed by widespread formation of hyaline tissue occurs in spite of the very small amount of dust which reaches the node. Chemical analysis of the nucleic acid content of these lymph nodes has shown that, at the time of the plasma cell reaction, the RNA/DNA ratio is definitely increased, as was to be expected in view of the abundant cytoplasmic RNA content of the globulin-producing plasma cells.

The intravenous injection of tridymite or quartz determines a marked reaction of reticuloendothelial cells mainly in the spleen and in the liver. The reaction in the spleen (Fig. 4), whose weight increases up to eight times the normal values, is very similar to that observed by Wissler and associates[22] in experimental animals after intravenous injections of formalin-killed Salmonella typhi vaccine. That is to say: "The stimulated primitive reticulum cells divide and give origin to cells with large vesiculated nuclei and a basophilic cytoplasm (plasmablasts or lymphoblasts) and to a very large number of plasma cell-like cells and to mature plasma cells. These new cells are identical to the antibody-forming cells."

In general we can state that a plasma cell reaction follows the formation of the primitive cluster(s) of dust-laden macrophages and that it is a prerequisite to the formation of hyaline tissue. Such plasma cell reaction may even take place at a certain distance from the dust-laden phagocytes. There seems to be a direct relationship between the degree of the plasma cell reaction and the amount of hyaline produced. In fact, the tissue reaction to the intratracheal injection of "inert" dusts is limited to the appearance of clusters of macrophages without plasma cells and hyaline (Fig. 5*a*).

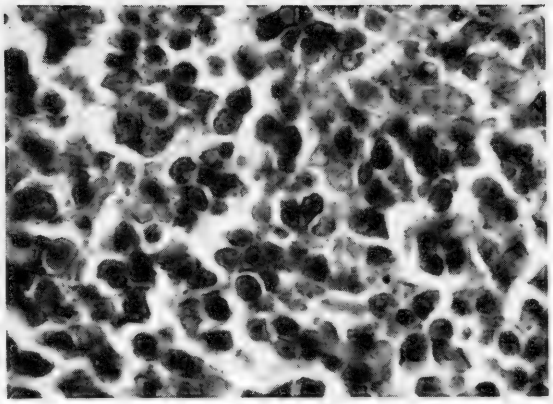


Fig. 4—Cell population in the red pulp of the spleen of a mouse 30 days after one intravenous injection of 5 mg of Tridymite (methyl green pyronine). The oil immersion preparation (1200 ×) demonstrates the abundance of pyroninophilic elements (description in the text) whose red-stained cytoplasm appears dark in the figure.

On the contrary, a limited amount of plasma cell reaction and hyaline formation is caused by dust with a low content of free silica (Fig. 5*b*), whereas plasma cells and hyaline in greater amount are peculiar features of the histological reactions to dust with a high content of free silica and quartz itself (Fig. 5*c* and *d*). Indeed, we believe that tridymite and HF-etched quartz induce a rapid formation of hyaline tissue because they determine, around the clusters of macrophages, a plasma cell reaction which is both earlier and more widespread than that caused by other dusts.

A definite relationship apparently exists also between the action of a dust on the macrophages and the plasma cell reaction which will follow. It seems that regressive changes in the cytoplasm of the phagocytosing cells must appear before the neighboring reticuloendothelial elements are stimulated to divide and begin their evolution as plasma cells; tridymite and HF-etched quartz very quickly determine alterations in the cytoplasm of the macrophages which have phagocytosed them, and these alterations are followed as quickly by a plasma cell reaction. As it is known that plasmablasts and plasma cells produce gamma globulins, it seems logical to assume that the plasma cells of the silicotic nodules and of the regional lymph nodes are the source of the gamma globulins which constitute the major part of the proteins of the silicotic hyaline.

The Role of Phagocytosis Versus Solution in Silicosis

All the above-mentioned chemical, immunological and morphological data support the hypothesis that the hyaline substance of silicosis

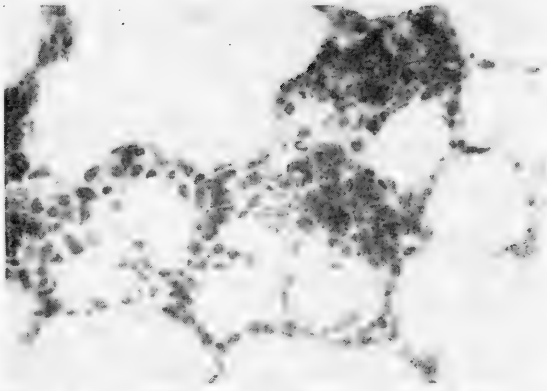


Fig. 5a—(methyl green pyronine, reduced about a fourth from mag. 380 ×). Rat lung four months after intratracheal injection of 50 mg of iron oxide dust: cellular reaction limited to phagocytosis of the dust.

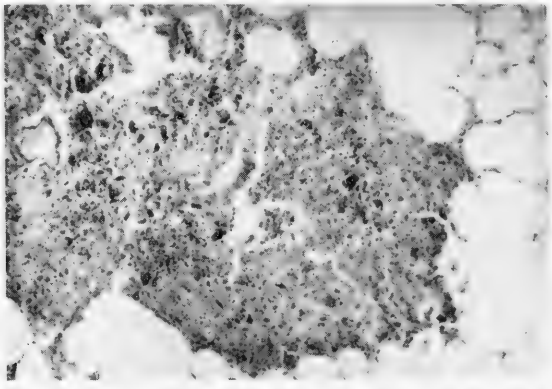


Fig. 5b—(methyl green pyronine, reduced about a fourth from mag. 170 ×). Rat lung four month after intratracheal injection of 50 mg of a slightly pathogenic dust (dust from silicoalluminous fire bricks; free silica about 5%). Small number of plasma cells at the periphery of the nodules.

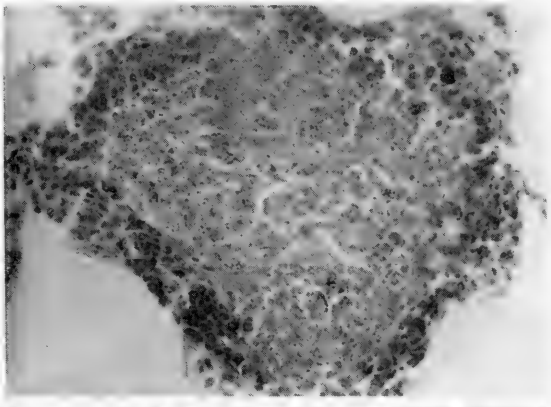


Fig. 5c—(methyl green pyronine, reduced about a fourth from mag. 350 ×). Rat lung four months after intratracheal injection of 50 mg of quartz; large halo of plasma cells (the cytoplasm stained red by pyronine appears dark in the figure) at the periphery of the nodule.

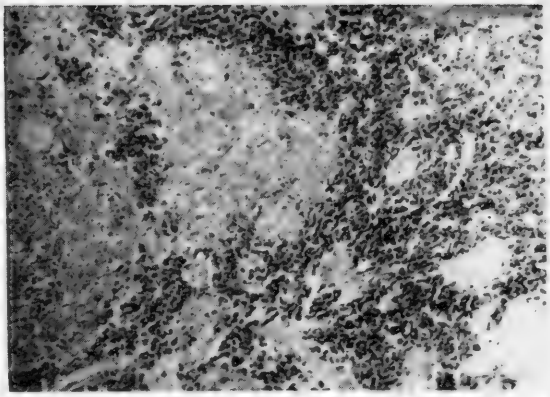


Fig. 5d—(methyl green pyronine, reduced about a fourth from mag. 170 ×). Rat lung four months after intratracheal injection of 50 mg of a highly pathogenic dust (cristobalite); abundant proliferation of plasma cells throughout the lesions.

is the result of immunological reactions. One may wonder if phagocytosis of quartz particles is a necessary prerequisite for an immunological reaction to silica, or if this might be induced by the silicic acid which dissolves in vivo from the quartz particles.

An experiment was performed[5] to study the role of the phagocytosing cells in the pathogenesis of silicosis and, at the same time, to obtain further information about the so-called solubility theory of silicosis. Fifty milligrams of quartz dust (particle size 1-3 μ) was sterilized and introduced in perspex chambers (Fig. 6) with millipore (0.3 μ) membrane walls. The pores of the membrane were permeable to the interstitial fluids and to any silicic acid (monomeric or polymerized) which might dissolve from the quartz particles but impermeable to the quartz particles themselves and to the mobile cells of the connective tissue. Two such chambers were implanted in the subcutaneous space of each of 10 rats, while in 10 other rats empty chambers were implanted as controls.

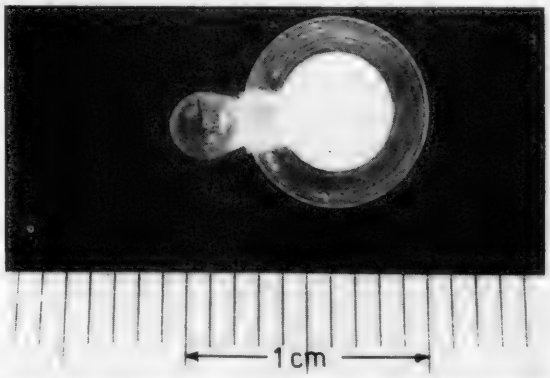


Fig. 6—Diffusion chamber with millipore membranes (Membranfilter-Göttingen).

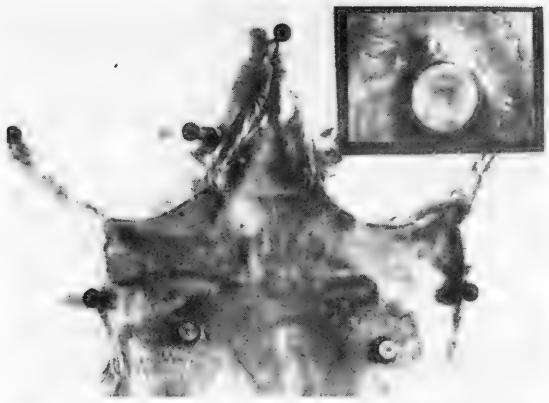


Fig. 7—Quartz-containing diffusion chambers after seven months in the subcutaneous space of the rat.

After seven months the tissues around the chambers were examined; no differences were observed (see Fig. 7) between the quartz-containing and the quartz-free ones. In both cases only a thin layer of fibroblasts was found adhering to the membranes and, although about 8% of the quartz had actually dissolved, no silicotic tissue at all was to be seen in the neighborhood of the quartz-containing chambers.

This experiment supports the opinion that silica, which is actually dissolved from quartz in vivo, appears nonetheless totally innocuous to the tissues when in solution. Therefore the "solubility theory" of silicosis seems improbable.*

It is important here to point out that the results of this experiment show directly that quartz causes silicosis only if it can be phagocytosed by the macrophages. This is in accordance with the aforementioned histological observations concerning the very first stages of experimental silicosis. These show that phagocytosis of the silica particles and regressive changes in the macrophages precede all cellular reactions which lead to the formation of the silicotic nodule.

The Activation of Reticuloendothelial Elements in Silicosis

Our observations show that there are stages in the development of silicosis: In the first stage the dust is phagocytosed; in the second there are regressive changes in the cytoplasm of the macrophages; in the third there is an activation of reticuloendothelial elements; and in the fourth antibodies are being produced which ultimately precipitate as hyaline substance. The third stage, namely the activation of the reticuloendothelial elements, deserved to be studied not only from the morphological but also from the functional point of view. This was done with some experiments whose results are summarized below.

1. *Variations in Nonspecific Resistance to Salmonella Typhimurium Infection in Mice Previously Treated with Tridymite Intravenously*[24]—The resistance to S. typhimurium infection is definitely increased in mice previously treated with a single intravenous injection of 5 mg of tridymite. The increase does not immediately follow the injection but appears only after 15 days and then persists for weeks. This effect clearly differentiates the action of tridymite from that of other particulate substances such as colloidal sulfur[25] or thorium dioxide (Thorotrast).[26] In fact the latter substances determine only a transient increase of the resistance of mice to some Gram-negative bacteria, which, moreover, does not extend to infection caused by the highly pathogenic S. typhimurium. The action of tridymite is similar to that of different polysaccharides or lipopolysaccharides of bacterial or cellular origin and is probably the consequence of stimulation of the splenohepatic sections of the reticuloendothelial system induced by tridymite.

2. *Bactericidal Activity of the Serum of Rabbits Previously Treated with Intravenous Injection of Quartz*—Using the technique of Blattberg,[27] we tested against Escherichia coli the serum of four rabbits previously treated with 280 mg of fine quartz dust intravenously. We found that the bactericidal power of these sera was definitely superior to that of normal rabbits (Fig. 8) and comparable in strength to that of rabbits treated in the Blattberg experiments with Zymosan (a yeast cell wall polysaccharide) plus Freund's adjuvants, or to that of rabbits treated with killed Gram-negative bacteria.[28]

3. *Antibody Response in Rabbits Treated with Intravenous Injections of Tridymite*[29]—The anti-egg-albumen production in rabbits injected intravenously with 120 mg of tridymite one month before the immunization with crystalline egg albumen, was found to be five to six times higher than that of control rabbits. This did not happen in rabbits pretreated with kaolin or coal dusts. This finding shows that treatment with crystalline silica determines a lasting increase of antibody production against any given protein antigen. In all probability this is the functional consequence of the widespread proliferation of plasmablasts and plasma cells which intravenous injections of crys-

*It is noteworthy that this same experiment has been performed at the same time and independently by Curran and Rowsell[23] in England: they have observed the same facts which we have just described and have reached the same negative conclusions concerning the "solubility theory" of silicosis.

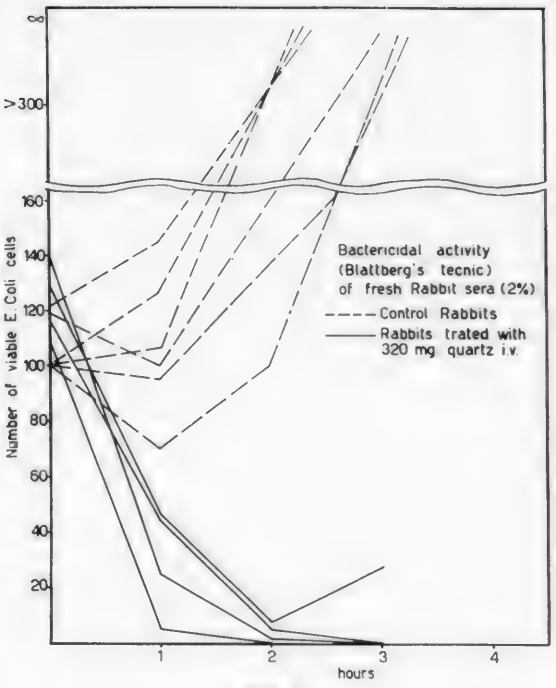


Fig. 8

talline silica determine throughout the reticuloendothelial system of experimental animals.

These three experiments show that crystalline silica is a powerful activator of the reticuloendothelial system. It is perhaps of special interest in our interpretation of the pathogenesis of silicosis that this activation implies an increase of the antibody-producing capacity of the organism. We know that, indeed, many dusts and different particulate matters may stimulate the reticuloendothelial system, but the activation produced by the silica dusts is different, inasmuch as it is intense, delayed, and comparatively lasting. The delay corresponds to the time which must elapse before the silica dust begins to determine regressive changes in the phagocytes. On the other hand, the kind of action obtained with silica is, in some respects at least, similar to that which follows treatment of the experimental animals with the endotoxins of Gram-negative bacteria. Therefore one can advance the hypothesis that the activation of the reticuloendothelial system is not a direct consequence of the injections of silica but that it is mediated through the changes which silica dust induces in the phagocytosing macrophages. We think that these macrophages might produce or set free substances capable of activating the reticuloendothelial system, perhaps in a way similar to that of endotoxic lipopolysaccharide.[26,30] This may explain the activation of reticuloendothelial elements remote from those actually in contact with the silica particles, as we have shown that this cannot be due to soluble silica.

The problem of the nature of these supposed active substances which, we think, stem from the macrophages after they have phagocytosed the particles of free silica, deserves careful attention. Indeed Pillemer[31] thought that from cells which have been damaged by bacterial endotoxins or other noxious agents "tissue products" may be set free which may influence serum properdin titers and nonspecific resistance to Gram-negative infection. Later Landy and Pillemer[34] collected evidence to show that these tissue products are protein-lipid-polysaccharide complexes and that they can be set free from the cells by a number of apparently unrelated agents such as trauma, x-ray irradiations, hemorrhagic shock, neoplastic transformation, Gram-negative infection, and so on. Very recently, moreover, Landy and Shear[33] have isolated chemically endotoxin-like lipopolysaccharides from various mammalian tissues.

These observations led us to think that the active substances which, as we suppose, are set free by the macrophages which have phagocytosed particles of crystalline silica might be essentially polysaccharide in nature.

Antipolysaccharide Antibodies in Silicosis

The above possibility is rather difficult to prove directly, but one may take advantage of the fact that the tissue lipopolysaccharides are, in all probability, also antigenic[33]; the possibility then exists that anti-cell-wall-polysaccharide antibodies might be produced in the course of experimental and human silicosis. We have tried to look for antibodies using as an antigen the well-known yeast-cell-wall-polysaccharide Zymosan, and, in fact, we have found that the sera of some silicotic patients (68% of cases of rapidly developing silicosis and 27% of cases of simple nodular silicosis) were able to agglutinate Zymosan, in the cold, at titers varying from 1:16 to 1:64. Normal human sera do not agglutinate Zymosan at these dilutions, but, as was to be expected, sera of patients with a variety of diseases with accepted or probable immunological pathogenesis (rheumatoid arthritis, autoimmune hemolytic anemia, nephritis, and so on) or with prolonged or extensive tissue breakdown (malignant tumors, myocardial infarctions) showed cold Zymosan agglutinins at titers comparable to those of the silicotic patients. We believe that in all these conditions, silicosis included, there is a liberation of autoantigenic polysaccharides from the walls of injured cells and that auto-

antibodies are subsequently produced. These antipolysaccharide autoantibodies may give a cross reaction with the yeast-cell-wall-polysaccharide Zymosan.

We should like to state clearly at this point that we do not believe that the immunological reactions of silicosis are the consequence of an antigenic stimulation due to silica itself or to a direct transformation into autoantigens of serum proteins adsorbed by the silica particles. In fact we believe that the latter opinion, which has been advanced by Scheel et al.,[34] by Antweiler and Hirsch,[35] and by Ishinishi and Miyazaki,[36] is based on insufficient evidence, inasmuch as the agglutination of serum-covered quartz particles by "antisera" obtained in the rabbit with intravenous injections of quartz might be due not to a specific antigen-antibody reaction but to the appearance of less specific factors similar to the "rheumatoid factor." It may be recalled here that bentonite[37] or quartz itself[38] may be used as particulate supports for gamma globulins instead of polystyrene latex to show the presence of the rheumatoid factor in the sera of patients suffering from rheumatoid arthritis. Moreover we could show that human gamma globulins do not change their antigenic character after adsorption on the surface of quartz particles.[39]

We do not believe that the immunological problem of silicosis will be solved by looking for antibodies against an antigen specific for silicosis itself, but we think that many possibilities must be borne in mind, for instance those following, which are both supported by experimental evidence.

1. The macrophages which have phagocytosed the silica particles undergo regressive changes and set free from their cytoplasm substances with autoantigenic properties. The exact nature of these supposed autoantigens is difficult to assess, but we may maintain that they have carbohydrates as determinants. This is in accordance with the appearance in the serum of some silicotic patients of anticarbohydrate antibodies as the aforementioned cold Zymosan agglutinins.

As most antibodies, cold Zymosan agglutinins are gamma globulins, and it is possible that after combining with autoantigens they precipitate in vivo as hyaline substance. From this point of view silicosis should be considered as an "autoimmune" disease and the immunological reaction of silicosis as independent of the action of external antigens. But we must consider also the following possibility.

2. From the dust-laden macrophages "active substances" are set free which activate the reticuloendothelial elements and make them likely to respond with abnormally increased antibody production to a challenge with different external antigens. From this point of view silicosis would be a disease due to an increased response to external antigens. The quartz would act as a permanent source of adjuvant substances.

The lung tissues are, indeed, always in contact with antigens which reach them either via the inhaled air or via the blood, and it must be remembered that any particulate antigen (such as a bacterium) which penetrates the interstitial pulmonary tissues follows exactly the same course as the dust particles. These antigens, reaching the reticuloendothelial elements of the silicotic granulomata which are in a condition of abnormally increased immunological responsiveness, will produce an excess of antibodies (regardless of the nature of the antigen). Such will contribute to the formation of the silicotic hyaline tissue.

In this second case the immunological processes which lead to the precipitation of a hyaline substance in the silicotic nodules would be very similar to the previously mentioned[21] precipitation of antibody molecules on the newly formed collagen fibers of the granuloma experimentally produced by the injection of alum-adsorbed antigens.

It is well known from countless clinical and experimental observations[40–45] that the tuberculous infection may greatly increase the pathogenic activity of quartz dust and that, on the other hand, the susceptibility to tuberculosis may be substantially modified by silicosis. In spite of extensive investigation, a satisfactory explanation of these mutual influences between silicosis and tuberculosis has never been given.

The immunological approach to silicosis gives a clue to the possible solution of this problem. In fact it is known that mycobacteria may stimulate nonspecifically the activity of the reticuloendothelial system[46] and the antibody-producing capacity of the organism.[47] In fact, killed tubercle bacilli are an essential constituent of the "Freund's adjuvants," very often used to increase the production of antibodies in experimental animals. Also the antibody response of tuberculous animals to nontuberculous antigens is greater than that of normal animals.[48,49] Therefore one can assume that the presence of tubercle bacilli or of their products may greatly increase the immunological response which follows the introduction of free silica dust.

On the other hand, the similarities which, as we have shown, exist between the reactions to quartz and those to endotoxic lipopolysaccharides lead to a possible explanation of the modi-

fications in the susceptibility to tuberculosis of silicotics. In fact Dubos et al.[50] have observed that endotoxic lipopolysaccharides influence deeply the susceptibility of mice to infection with mycobacteria. This influence can consist of both, an increase and a decrease of susceptibility according to the time elapsing between treatment and infection: when the lipopolysaccharide is administered simultaneously with the infective agent a depression of resistance will regularly ensue. If in the course of silicosis there is a continuous or prolonged liberation of endogenous substances acting more or less as the endotoxic lipopolysaccharides, then there is a considerable chance that a superimposed tuberculous infection will find the organism in a condition of *decreased* resistance. Also it must be remembered that endotoxic polysaccharides can transform a latent tuberculous infection into an active one.[50]

We realize that we have only started an immunological approach to silicosis and that, though some facts may be considered as established, many other points are largely hypothetical and need experimental verification. Perhaps the most important point which remains to be studied is the intracellular mechanism through which the crystalline silica particles (and not, or to a much smaller extent, other mineral dusts) induce the liberation from the macrophages of immunologically "active" substances.

The immunological approach to sicilosis leads to the consideration of the collagen of the silicotic nodule as the byproduct of a reticuloendothelial immunologic reaction and not as the "specific" and direct consequence of the "fibrogenic" action of a given dust. This approach seems, moreover, to shed some light on the relationship between pneumoconiosis and infections and on the individual susceptibility to silicosis.

Summary

The various approaches to silicosis based on solubility of silica dust or on mechanical or surface activity of the particles have not explained satisfactorily the pathogenesis of the disease.

A number of experimental data are given in the present article which put forward an immunological approach to silicosis. These are (1) presence of high amounts of gamma globulins in the hyaline tissue of silicosis; (2) chemical similarities between the silicotic hyaline and some fibrinoids of diseases with an immunological pathogenesis; (3) appearance of many plasma cells and their precursors during the development of the silicotic nodule and in the draining lymph nodes; (4) induction of a local or generalized activation of the reticuloendothelial system by crystalline silica dust; (5) variations in nonspecific immunity after introduction of free silica dust, similar to those determined by endotoxic lipopolysaccharides; and (6) appearance of antipolysaccharide antibodies in the serum of some silicotic patients.

The working hypothesis is advanced that silica dust modifies the macrophages which have phagocytosed it in such a way that these set free substances, probably polysaccharides, which activate the reticuloendothelial system and are autoantigenic.

It seems that the immunological approach offers a better explanation of many aspects of the pathogenesis of silicosis, including the relationships between silicosis and tuberculosis, than any other alternative hypothesis available at present.

References

1. Gye, W. E., and Purdy, W. J.: Poisonous Properties of Colloidal Silica: Effects of Repeated Intravenous Injections on Rabbits; Fibrosis of Liver, Brit. J. Exper. Path. 3:86, 1922.

2. Jager, R.: Die Rolle der Ordnungszustände bei der Wechselwirkung zwischen Quarz und Organismus, in Die Staublungenerkrankungen, Vol. 2, p. 142, 1954.

3. Seifert, H.: Mineralogisch-physikalische Grundlagenforschung in Die Staublungenerkrankungen, Vol. 2, p. 199, 1954.

4. King, E. J.; Zaidi, S. H., and Nagelschmidt, G.: Silica Solubility Theory of Silicosis; Difficulties of Interpretation, A.M.A. Arch. Indust. Health 13:133, 1956.

5. Pernis, B.; Clerici, E., and Ghezzi, I.: Med. Lavoro 49:672, 1958.

6. Vigliani, E. C.; Boselli, A., and Pecchiai, L.: Studi sulla componente emoplasmatica della silicosi, Med. Lavoro 41:33, 1950.

7. Pecchiai, L.: Proc. XV Congress Ital. Soc. Occup. Med., Genova, p. 606, 1949.

8. Pernis, B.: Über die Aminosäurezusammenseitzung von Hyalinsubstanz der Silikoseknotchen in Die Staublungenerkrankungen, Vol. 2, p. 293, 1954.

9. Pernis, B., and Ghislandi, E.: Studi chimico-biologici sul tessuto jalino della silicosi: III. Identificazione di una frazione proteica avente le caratteristiche chimiche delle beta-globuline, Med. Lavoro 47:460, 1956.

10. King, E. J.; Maguire, B. A., and Nagelschmidt, G.: Further Studies of Dust in Lungs of Coalminers, Brit, J. Indust. Med. 13:9, 1956.

11. Pernis, B.: Studi chimico-biologici sul tessuto jalino della silicosi; gli spettri di assorbimento nell'-ultravioletto, Med. Lavoro 46:668, 1955.

12. Clerici, E., and Pernis, B.: Studi chimico-biologici sul tessuto jalino della silicosi; V. I Lipidi, Med. Lavoro 48:449, 1957.

13. Pernis, B., and Clerici, E.: Studi chimico-biologici sul tessuto jalino della silicosis; IV. Sul Contenuto in Carboidrati, Med. Lavoro 48:238, 1957.

14. Pernis, B.; Bairati, A., and Frigerio, G.: La Ultrastruttura del tessuto jalino della silicosi, Med. Lavoro 47:439, 1956.

15. Ceppellini, R., and Pernis, B.: Presence of Plas-

ma Globulins in the Hyaline Tissue in Cases of Silicosis, Nature, London, 181:55, 1958.

16. Pernis, B.; Ceppellini, R., and Ghezzi, I.: Analisi immunologica del nodulo silicotico, Med. Lavoro 48:380, 1957.

17. Grabar, P., and Williams, C. A.: Mèthode permettant l'étude conjugée des propriétés électrophorétiques d'un mélange de protéines: Application au sérum sanguin. Biochim. Biophys. Acta 10:193, 1953.

18. Licht, W.: Proc. Journées Franç. Pathologie Minière, Paris, Oct. 24-28, 1958 (in the press).

19. Vaquez, J., and Dixon, F.: Immunohistochemical Analysis of Lesions Associated with Fibrinoid Change, A.M.A. Arch. Path. 66:504, 1958.

20. Movat, H. Z.: The Concept of Fibrinoid, Am. J. M. Sc. 236:373, 1958.

21. White, R. G.; Coons, A. H., and Connolly, J.: Studies on Antibody Production: Alum Granuloma, J. Exper. Med. 102:73, 1955.

22. Wissler, R. W.; Fitch, F. W.; La Via, M. F., and Gunderson, C. H.: J. Cellular & Comp. Physiol. 50 Suppl. 1, 265, 1957.

23. Curran, R. R., and Roswell, E. V.: The Application of the Diffusion Chamber Technique to the Study of Silicosis, J. Path. & Bact. 76:561, 1958.

24. Pernis, B., and Bolis, L.: Proc. III Internat. Symposium of the Reticulo-Endothelial Soc. Rapallo, August, 1958 (in the press).

25. Kiser, J. S.; Lindh, H., and De Mello, G. C.: The Effect of Various Substances on Resistance to Experimental Infections, Annals New York Acad. Sc. 66:312, 1956.

26. Howard, J. C.; Rowley, D., and Wardlaw, A. C.: Investigations on the Mechanism of Stimulation of Nonspecific Immunity by Bacterial Lipopolysaccharides, Immunology 1:181, 1958.

27. Blattberg, B.: Increase in Bactericidal Activity as a Result of Injection of Zymosan, Proc. Soc. Exper. Biol. Med. 92:745, 1956.

28. Zanussi, C. and Taschini, M.: Personal communication to the author.

29. Ghiringhelli, L., and Pernis, B.: Med. Lavoro 49: 665, 1958.

30. Benacerraf, B., and Sebestyen, M.: Effect of Bacterial Endotoxin on the Reticuloendothelial System, Fed. Proc. 16:860, 1957.

31. Pillemer, L.: The Nature of Properdin System and Its Interreactions with Polysaccharides Complexes, Ann. New York Acad. Sc. 66:233, 1956.

32. Landy, M., and Pillemer, L.: Increased Resistance to Infection and Accompanying Alteration in Properdin Levels Following Administration of Bacterial Lipopolysaccharides, J. Exper. Med. 104:383, 1956.

33. Landy, M., and Shear, M. J.: Similarity of Host Response Elicited by Polysaccharides of Animal and Plant Origin and by Bacterial Endotoxins, J. Exper. Med. 106:77, 1957.

34. Scheel, L. D.; Smith, B.; van Riper, J., and Fleisher, E.: Toxicity of Silica; Characteristics of Protein Films Adsorbed by Quartz, A.M.A. Arch. Indust. Hyg. 9:29, 1954.

35. Antweiler, H., and Hirsch, E.: Weitere tierexperimentale Untersuchungen zum Problem der Antikörperbildung bei der Silikose, Ztschr. Immunitätsf. 114:378, 1957.

36. Ishinishi, S., and Miyazaki, T.: Reports of the Mitsui Medical Research Institute for Industry, 1957.

37. Bozicevich, J.; Bunim, J. J.; Freund, J., and Ward, S. B.: Bentonite Flocculation Test for Rheumatoid Arthritis, Proc. Soc. Exper. Biol. Med. 97:180, 1958.

38. Klosterkotter, W.: Personal communication to the author.

39. Pernis, B.; Ghezzi, E., and Clerici, E.: Med. Lavoro, 1959 (in the press).

40. Mavrogordato, A.: Pub. South African Inst. Med. Res., No. 49, vol. 3, p. 1, 1926.

41. Gardner, L. U.: Proc. Internat. Silicosis Conference, Johannesburg, 1930.

42. Vorwald, A. J., and Delahant, A. B.: Influence of Silica on Natural and Acquired Resistance to Tubercle Bacillus, Am. Rev. Tuberc. 38:347, 1938.

43. Attygalle, D.; Harrison, C. V.; King, E. J., and Mohanty, G. P.: Infective Pneumoconiosis: Influence of Dead Tubercle Bacilli (B.C.G.) on Dust Lesions Produced by Anthracite, Coal-Mine Dust and Kaolin in Lungs of Rats and Guinea-Pigs, Brit. J. Indust. Med. 11:245, 1954.

44. Zaidi, S. H.; Harrison, C. V.; King, E. J., and Mitchinson, D. A.: Experimental Infective Pneumoconiosis; II. Coal-Mine Dust with Attenuated Tubercle Bacilli (B.C.G.) in the Lungs of Immunised Guinea-Pigs, Brit. J. Exper. Path. 36:539, 1955.

45. Levis, F.; Olivieri, A., and Pernis, B.: Med. Lavoro, 1958 (in the press).

46. Boehme, D., and Dubos, R. J.: The Effect of Bacterial Constituents on the Resistance of Mice to Heterologous Infection and on the Activity of their Reticuloendothelial System, J. Exper. Med. 107:523, 1958.

47. Freund, J., and McDermott, K.: Sensitization to Horse Serum by Means of Adjuvants, Proc. Soc. Exper. Biol. & Med. 49:548, 1942.

48. Dienes, L.: Further Observations Concerning Sensitization of Tuberculous Guinea-Pigs, J. Immunol. 15: 153, 1928.

49. Lewis, P. A., and Loomis, D.: Allergic Irritability: Formation of Anti-Sheep Hemolytic Amboceptor in Normal and Tuberculous Guinea-Pigs, J. Exper. Med. 40:503, 1924.

50. Dubos, R. J.; Schadler, R. W., and Boehme, D.: Effects of Bacterial Endotoxins on Susceptibility to Infection with Gram-Positive and Acid-fast Bacteria, Fed. Proc. 16:856, 1957.

Detection and Management of Emotional Disorders by the Industrial Physician

John G. Hipps, M.D., Sc.D., Pittsburgh

THE INDUSTRIAL physician is in a unique position to participate in the important field of mental health through the early detection and management of psychiatric illness. The preemployment and periodic examinations and the evaluation of employees before and after absence for illness permit observation of the mental, as well as the physical, health of the employed population. The physician's continuous presence within the work environment places him in intimate contact with that facet of the working person's life, the job, where he must be acceptably adjusted and where he is most critically judged. For these reasons he is provided with frequent opportunities to see people with emotional disorders when they are incipient, early, or mild.

The need for greater utilization of this opportunity has been discussed by other writers. Menninger and Levinson[1] have pointed out the lack of attention the occupational area of a person's daily life has received by psychiatrists and have emphasized the importance of developing greater interest in the field. Klemes[2] has emphasized the need for preventive psychiatry in the form of training programs directed toward the education of management personnel for handling "human relations" problems. Felix[3] has proposed the need of a mass approach for the prevention and prompt management of psychiatric illness and described the application of psychiatric principles to supervisor leadership, accident prevention, and the social and medical problems of older workers. Collins[4] has discussed the importance of the physician-patient relationship technique and the interviewing technique in the management of psychiatric disorders in industrial workers. Vickery[5] has discussed the importance of returning the individual to work promptly following absence for an emotional disorder and also how the industrial physician may participate in the worker's rehabilitation.

The material presented in this paper demonstrates how the industrial physician may participate positively in the field of mental health by reporting on the detection, management, and short-term results of a group of 117 employees with emotional disorders.

Detection

A desirable basis for the management of emotional disorders is a means for early detection. The sources routinely used in the plant population from which the present group of patients were obtained are the personnel department, the supervisor, the nurse, and the doctor. Reasons for detection through the personnel department were request for transfer by the supervisor or employee and disciplinary action. The supervisor served as a means of detection because of a high level of insight into the human relations aspect of his job and because of an awareness of, and access to, an interested medical department. The most frequently encountered reasons for detection through this source were absenteeism, the onset of poor job performance, problems of interpersonal relations, and change in an employee's usual behavior. An industrial health service routinely conducive to dispensary visits for nonoccupational illnesses and injuries also facilitated the detection of emotional disorders. Employee awareness of the health service's total interest in them was an encouragement to seek advice for a variety of problems not related to the job. As a result, the nurses became aware of emotional disorders by the direct presentation of patients with acute emotional illnesses, by noting frequent dispensary visitors, and through their own impressions of

Dr. Hipps is physician to the Monangahela Connecting Railroad Company.

Table I—Source of Detection of a Group of 117 Employees With Emotional Disorders

Source	No.	%
Personnel Department	1	< 1
Supervisor	14	12
Nurse	10	9
Doctor	92	78
Total	117	100

the patient and his presenting symptoms. The doctor served as a source of detection by maintaining a constant awareness for suggestive symptoms and signs during preemployment and periodic examinations, in his evaluation of employees returning to work following absence from illness, and during voluntary visits to the dispensary.

Table I shows the source of detection for the group of 117 employes with emotional illnesses that are discussed in this report. The personnel department was the least frequent source and accounted for less than 1% of cases. Twelve per cent of the cases came directly from supervisors, nine per cent were discovered by nurses, and the remaining seventy-eight per cent were detected by the author.

Characteristics of the Emotional Disorders

Of the 117 patients, there were 81% with psychoneuroses, 5% with psychoses, 11% with transient situational disorders, and 3% with personality disorders (alcoholism). Of the group 75 were males and 22 were females. This is a ratio of 4 to 1 in a plant population where the male to female ratio is 5 to 1. Severity of the illness was considered mild in 58% of the patients, moderate in 32%, and severe in 10%. Judgment of severity was made by the author using the criteria: absenteeism due to illness, degree of interference with job performance or interpersonal relations, and intensity of subjective feelings in the patient. Of the cases 64% were without previous occurrence, 36% of the patients had one or more previous episodes of acute illness, and 19% had never received treatment. At the time of detection, 20% were under some degree of treatment and 80% were not. Table II summarizes the characteristics of the illnesses in this group of employees in more detail.

Management of the Patients

As shown in Table III, 44% of the patients were treated by the author, 29% by family doctors, 14% by psychiatrists, and 13% received no treatment. All the persons in the in the untreated group had been referred to their family doctors. Some of them did not follow this advice because they preferred to "take care of themselves." Others were seen by their family doctors and treated for physical, rather than emotional illnesses.

The criteria that were used by the author for determining which cases to treat in the plant medical department are as follows:

1. Mild illness of a probable short duration with recovery anticipated after two or three visits
2. Illness requiring little or no medication
3. When the job was of major importance and the solution readily attained by discussion with co-workers
4. In anticipation of significant delay in seeing a family doctor or psychiatrist for economic reasons or because of the absence of a family doctor

Four steps were followed by the author in the management of the patients:

Step One—Judgment evaluation of symptoms as being nonorganic in etiology

Step Two—Physical examination to substantiate the absence of organic disease, the extent depending on the nature and intensity of symptoms

Step Three—Explanation to the patient that the illness is an emotional one and advice as to the nature of, and need for, treatment

Table II—Characteristics of Emotional Disorders in a Group of 117 Employees by Type, Sex, Severity, Duration, and Previous Treatment

Characteristic		No.
Type	Psychoneurosis	95
	Psychosis	6
	Transient situational reaction	13
	Personality disorder (alcoholism)	3
Sex	Female	22
	Male	95
Severity	Mild	68
	Moderate	37
	Severe	12
Previous history	None	75
	Recurrent	42
Treatment status at time of detection	Under treatment	24
	Not under treatment	93

Table III—Treating Physician for a Group of 117 Employees with Emotional Disorders

By Whom Treated	No.	%
Author	52	44
Family doctor	34	29
Psychiatrist	16	14
Not treated	15	13
Total	117	100

Step Four—Use of psychotherapy

Relatively little difficulty was encountered in getting the patients to accept their illness as emotional in nature. In all cases this was accomplished except possibly for those in the untreated group who did not see their family doctors. The fact that these patients preferred "to take care of themselves" may be an indication that some of them did not accept their illness as psychiatric.

The following techniques as described in Levine's "Psychotherapy in Medical Practice"[6] were used by the author in treating the patients:

A. Methods for the general practitioner
   1. Physical examination as psychotherapy
   2. Reassurance
   3. Suggestion
   4. Giving of information
   5. Changing the attitude in the environment
   6. Guidance and advice
   7. Noncondemning constructive relationship
   8. Ignoring of certain symptoms and attitudes
   9. Satisfaction of frustrated basic needs
   10. Satisfaction of neurotic needs

B. Advanced methods for the general practitioner
   1. Confession and ventilation
   2. Life discussion
   3. Desensitization
   4. Persuasion and reeducation

Of the 16 patients treated by psychiatrists, 10 were hospitalized, 3 were absent from work and treated as outpatients, and 3 were treated as outpatients while remaining at work. Seven of the patients were referred by the author directly to the psychiatrist, four were referred through their family doctors, and five were referred directly by their family doctors. Active communication by telephone or letter was maintained with the psychiatrist beginning with the patient's referral. In 10 cases pertinent information from the work environment was given by the author that was useful to the psychiatrist in his management of the patient. Periodic follow-up was carried out for the following purposes: (1) to advise the supervisor as to the progress of an employee absent from work so that the supervisor would be able to plan accordingly; (2) to inform the psychiatrist and the patient of the availability of the patient's job; (3) to inform the psychiatrist of the patient's adjustment at work when the patient was being treated while working or after the patient had returned to work following absence for the illness.

Of the 16 patients treated by psychiatrists, 5 were returned to work before complete recovery in an attempt to aid in recovery. Two of these patients had exacerbation of their illness within two weeks after return to work and were placed on sick leave a second time. Ten of the sixteen returned to, or stayed at, the same job, and six were selectively returned or transferred to other jobs as indicated, this determination being jointly made by the psychiatrist and the author. After return to work all patients were seen by the author at regular intervals to evaluate the stability of their recovery as manifested on the job. This information was transmitted to the psychiatrist when indicated. These patients were encouraged to continue outpatient follow-up visits to the psychiatrist until discharged from further treatment.

Results

Evaluation of results after a period ranging up to 12 months is made with an awareness of the limitation of short-term follow-up. No conclusions can be made, but certain indications are evident. Assessment of the degree of recovery was based on the improvement or absence of symptoms, the patient's opinion, and the supervisor's impression. For those treated by the author, 62% were considered recovered and without recurrence. Thirty-two per cent were considered definitely improved with occasional mild recurrence of symptoms. Six per cent were considered essentially unchanged and continued under periodic treatment.

In the group of 34 patients treated by family physicians, 18% were judged as recovered, 47% as definitely improved, and 35% as essentially unchanged.

Of the 16 patients treated by private psychiatrists, 25% were considered recovered, 50% as definitely improved, and 25% as essentially unchanged.

When results are evaluated for the patients as a single group, 41% were considered recovered, 40% as definitely improved, and 18% as essentially unchanged. These data are summarized in Table IV.

The reader is reminded that no statistical significance can be assigned to the above results because of the absence of a control group, the method of case selection, and the means by which the results were assessed. Some of the obvious influencing factors were: (1) The author's group included more of the mild disorders for which complete recovery would be more likely; (2) Many of the patients in the family physician's group were not treated psychotherapeutically except for the prescribing of medications; and (3) The follow-up period was relatively short.

Summary and Conclusion

The need for a greater utilization of the working population in advancing the field of

Table IV—Results of Treatment in a Group of 117 Employees with Emotional Disorders

Results	Author		Psychiatrist		Family Doctor		Entire Group	
	No.	%	No.	%	No.	%	No.	%
Recovered	32	62	4	25	6	18	42	41
Definitely improved	17	32	8	50	16	47	41	40
Essentially unchanged	3	6	4	25	12	35	19	19
Total	52	100	16	100	34	100	102	100

mental health is pointed out. This discussion of the detection and management of a group of 117 patients with emotional disorders illustrates how the industrial physician may effectively contribute to the management of these conditions in industrial workers. Experience with those patients treated by psychiatrists indicates the value of the physician's observation of job adjustment in the patient's management. Return to work may be facilitated or used therapeutically when there is good communication between the psychiatrist and the plant physician.

Dr. Hipps' address is 675 Princeton Blvd., Pittsburgh, 21.

References

1. Menninger, W. C., and Levinson, H.: Industrial Mental Health, Observations and Prospectives - The Menninger Foundation Survey, *Indust. Med. & Surg.* 24:89-93 (Feb.) 1955.

2. Klemes, M. A.: The Psychiatrist in Industry—A Preventive Approach, *Indus. Med. & Surg.* 24:127-130 (March) 1955.

3. Vickery, C. C.: Rehabilitation of the Emotionally Ill, *Indus. Med. & Surg.* 25:229-232 (May) 1956.

4. Felix, R. H.: Practical Psychiatry in Industry, *A. M. A. Arch. Indust. Health* 17:614-619 (June) 1958.

5. Collins, R. T.: Practical Application of Psychiatric Techniques in Industry, *A. M. A. Arch. Indust. Health*, 17:620-623 (June) 1956.

6. Levine, M.: Psychotherapy in Medical Practice, New York, The Macmillan Company, 1949.

THE DEPARTMENT OF PREVENTIVE MEDICINE

COLLEGE OF MEDICINE

THE OHIO STATE UNIVERSITY

offers

PROGRAMS OF GRADUATE EDUCATION

in

OCCUPATIONAL MEDICINE

AVIATION MEDICINE

The programs of postgraduate education are designed to qualify physicians for a Master's Degree and to meet the requirements of the American Board of Preventive Medicine in these component specialties.

The course of study in both specialties is given concurrently on the basis of an identity of interests and requirements necessary for proficiency. Hence, the first two years are devoted to study of basic disciplines of environment health and hygiene, while the third year is spent in medical organizations pertinent to the specific practice of either of these specialties.

Physicians who have completed one year of hospital internship may apply for either program, both of which have been approved by the AMA Council on Medical Education and Hospitals.

For further information and application forms, write: William F. Ashe, M.D., Chairman, Department of Preventive Medicine, The Ohio State University, 410 West Tenth Avenue, Columbus 10, Ohio.

Dermatitis in a Chemical Industry

William R. Buckley, M.D., and John L. Norris, M.D., Rochester, New York

THIS PAPER presents a tabulation of diagnoses on some 2,370 cases of dermatitis occurring in an industry manufacturing photographic material and chemicals and carrying out many allied mechanical and chemical operations. This study has been made of cases presenting problems in diagnosis or treatment referred to the dermatologist for diagnosis and determination of a possible occupational cause or aggravation. Uncomplicated cases were cared for by the staff physicians; so this does not represent the full magnitude of skin problems occurring in a total plant population of about 33,000 employees during the four years included in this study.

Occupational Cases

Since occupational dermatitis is numerically one of the more important industrial medical problems, the identification and differentiation of these cases, the majority of which are non-occupational, is of great importance to the individual, to the industry, and to the physician.

Twenty-six per cent of the total number of dermatologic cases seen presented an occupational skin disease. Of these occupational dermatoses, 83% occurred in men, in a plant population with 74% male employees. This confirms our impression that the male population in general is employed on jobs with greater risk of skin irritation.

There are almost as many schemata of classification of dermatologic disorders as there are dermatologists. There appears to be no one satisfactory classification available at this time. The groupings used in this classification appeared to be the most applicable to interpretation by the industrial physician. Of the total cases reported in the study, 618, or 26%, were considered to be occupational, and 83% were among male and 17% among female employees.

	No.	Cases % of Total (2,370)
I. Diseases Due to Contact with External Agents	523	22.0
A. Contact dermatitis	443	18.7
1. Sensitization type	235	9.9
2. Primary irritant type	158	6.7
3. Photodermatitis	1	
4. Unclassified	49	2.1

Diseases due directly or indirectly to contact with external agents accounted for 85% of the 618 occupational cases seen in consultation.

	No.	Cases % of Total
B. Skin dryness	27	1.1

Excessive drying of the skin can come from handling solvents, from operations such as paper sorting or boxing of materials in paper containers, or just from working in areas where the relative humidity is kept below 50%. Over one half of the cases listed in this report were from the latter mentioned areas. Provision of hand lotions and creams in the wash rooms should reduce the frequency of this problem. There are several excellent lotions and creams on the market. We supply two hand lotions of the following composition:

Lotion 1	Lotion 2
Glyceryl monostearate	Glyceryl monostearate
Stearic acid	Glycerin
Oleic acid	Triethanolamine
Cetyl alcohol	Stearic acid
Lanum	Cetyl alcohol
Triethanolamine	Methylparaben
Afcolant	Propylparaben
Campagnie Parento Perfume	Propylene glycol
Distilled water q.s.	Carbitol
	Ethyl alcohol
	Sesame oil
	Perfume "Q"
	Distilled water q.s.

Dr. Buckley is Instructor in Medicine (Dermatology), The University of Rochester School of Medicine and Dentistry; Assistant Physician, Strong Memorial Hospital; and Consultant in Dermatology, Eastman Kodak Company, Rochester, N. Y. Dr. Norris is Clinical Assistant Professor of Medicine (Occupational Medicine), The University of Rochester School of Medicine and Dentistry; Associate Physician, Strong Memorial Hospital; Associate Medical Director, Eastman Kodak Company, Rochester, N. Y.

These lotions are the most satisfactory we have found for our purposes.

	Cases	
	No.	% of Total
C. Aggravation of Preexisting disease	27	1.1
1. Psoriasis (Kobner effect)	14	0.6
(a) Solvents	5	
(b) Alkalis	4	
(c) Heat	3	
(d) Acids	1	
(e) Other (Chemicals)	1	
2. Disseminated neurodermatitis	7	0.3
3. Recalcitrant pustular eruption of hands	6	0.2

Aggravation of preexisting disease (27 cases due to the causes listed and 9 other cases due to trauma) involved about 0.1% of the total plant population. There is no question that this figure is minimal; moreover, we think that it points up the considerable value of proper assignment of personnel following preplacement examination.

	Cases	
	No.	% of Total
D. Folliculitis due to cutting oils	10	0.4

Folliculitis from insoluble cutting oils represents 1.6% of the total number of occupational cases. Most of these cases arose in connection with the machining of aluminum. Here multiple stepwise cuts were made in a solid rod of the metal, producing a thin hollowed-out shell. The machines operate six spindles, and thus the quantity of extremely small, sharp aluminum chips was considerable. Minor trauma to the skin of the forearms was a frequent accompaniment and, at times, the initiating factor for the development of the folliculitis.

	Cases	
	No.	% of Total
E. Thermal burns	8	0.3

Because of the importance in obtaining optimum cosmetic results, burns of the face were referred to the dermatologist. Burns elsewhere on the body were completely cared for by the staff physicians.

	Cases	
	No.	% of Total
F. Primarily involving mucous membranes	8	0.3
1. Chemical conjunctivitis	3	
2. Rhinitis	5	
(a) Nonallergic	4	
(b) Allergic	1	

Cases of rhinitis were given a complete allergic work-up in addition to being skin tested with the suspected antigen. Elimination of exposure to the offending dust, rather than the undertaking of any desensitization program, was the ultimate goal in handling these situations.

	Cases	
	No.	% of Total
II. Diseases Due to Trauma	63	2.7
A. Contusions, abrasions, ecchymoses, etc.	27	1.1
B. Friction	14	
C. Aggravation of preexisting disease: Psoriasis (Kobner effect)	9 9	
D. Foreign body reaction	7	
E. Excessive callus formation	5	0.2
F. Milia	1	

Diseases due to trauma are for the most part self-explanatory. The referrals were chiefly to confirm a diagnosis or request suggestions for further therapy. The term "Kobner effect" or phenomenon refers to the incitation of a lesion of injury which tends to duplicate the preexisting skin disease. For example, in a person with lesions of psoriasis or lichen planus, trauma to the skin will produce typical psoriatic or lichen planus-type lesions at the site of the trauma. Thus, the 9 cases of psoriasis mentioned as being aggravated by trauma were included in the discussion of aggravation of preexisting disease previously mentioned.

	Cases	
	No.	% of Total
III. Diseases Due to Infection	24	1.0
A. Bacteria	20	0.8
1. Infectious eczematoid dermatitis	16	0.7
2. Paronychia	2	
3. Acute cellulitis	2	
B. Yeast	2	0.1
1. Paronychia	2	
C. Fungi	1	
1. Ringworm of nails (Tinea unguium)	1	
D. Virus	1	
1. Herpes zoster (traumatic)	1	

The 20 cases due to bacterial infection represent 3% of the total occupational skin problems. Early attention by the employee while at work to minor cuts, abrasions, and other injuries by reporting immediately to the medical department for treatment is essential in keeping these cases at the minimum. Bacterial infections in the nonoccupational group amount to 6% of the total nonoccupational cases. We believe that this really significant difference is due to prompt medical treatment.

	Cases	
	No.	% of Total
IV. Diseases Due to Drugs	4	0.2
A. Serum sickness	4	
1. Penicillin	3	
2. Tetanus antitoxin	1	

Diseases due to drugs used in the treatment of occupational diseases represent less than

0.2% of the total cases referred. Penicillin is now used only when definitely indicated by bacteriologic studies, after a careful history, and never by topical application. Oral preparations are used when possible. Intradermal skin testing has not been found to be of any real value in screening patients prior to giving penicillin.

Dermal reactions to antitetanus serum have not been a problem with us to date. The question of whether to give the initial immunization series of tetanus toxoid to non-immunized employees, or to give "booster" shots at regular intervals to those who have had the series appears always to be under discussion. Present data, based largely on an immunized work force is of little value in contributing a valid judgment to this problem.

	Cases	
	No.	% of Total
V. New Growths	2	0.1
A. Basal-cell epithelioma	1	
B. Senile keratosis	1	

New growths, occurring as occupational diseases, have not been a significant problem. The basal cell epithelioma mentioned appeared to be directly related to trauma. Multiple senile keratosis of the cheeks and dorsal hands were found in one of our roofing engineers. In addition to sun exposure as the occupational factor, this engineer was an ideal candidate to develop such a difficulty with his red hair, freckled complexion and his hobbies of fishing and hunting.

	Cases	
	No.	% of Total
VI. Miscellaneous	2	0.1
A. Argyria	1	
B. Miliaria rubra	1	

The miscellaneous group is self-explanatory. With the presently available technique for handling silver and its salts, development of argyria is so gradual, and an occasional casual disregard of outlined precautions creates so little immediate increased skin pigmentation that maintenance of the degree of personal hygiene necessary for complete prevention requires constant watchfulness by supervision. There is always one person in a group who feels that precautions as outlined do not apply to himself.

Sweat retention phenomena are seen uncommonly in dermatologic consultation as a primary diagnosis.

Nonoccupational Cases

The number of nonoccupational cases studied in this series was 1,752, or 74% of the total. Of these, 75% were among male and 25% among female employees. There are some general remarks to be made on the tabulation of the nonoccupational diseases. A primary responsibility of the industrial physician is to determine whether or not a causal relation exists between the symptom or sign with which a patient-employee reports and the occupation. Basic here is diagnosis—even if it is only a reasonable working diagnosis. In no field of practice is this more important than in dermatology. Perhaps the most valuable function of a dermatologist in an industrial medical group is to assist the staff physicians in making a diagnosis. In so doing, the general standard of dermatologic practice is elevated in the group as a whole.

The tabulation of the nonoccupational cases in this paper is prepared to alert the industrial physician to the variety of skin problems that may be presented to him. In spite of its length, from the dermatologists' standpoint it is oversimplified. For example, no dermatologist includes all cases of localized neurodermatitis under "Diseases Due to Neurosis," nor does he think of seborrheic dermatitis or rosacea as being only "Diseases Due to Disorders of the Sebaceous Glands."

Many of the patients presented more than one skin condition; hence, there are more diagnoses tabulated in the nonoccupational group than the number of patients seen. In the occupational group only the primary diagnosis was tabulated.

I. Diseases Due to Infection—371	
A. Fungi—132	
1. Tinea pedis (with "id")	69
2. Tinea manuum	21
3. Tinea versicolor	14
4. Tinea cruris	13
5. Tinea corporis	8
6. Tinea unguium	7
B. Viruses—120	
1. Verrucae	48
2. Herpes zoster	32
3. Herpes simplex	27
4. Herpes progenitalis	3
5. Herpetic gingivostomatitis	3
6. Rubeola	2
7. Varicella	1
8. Infectious mononucleosis	1
9. Kaposi's varicelliform eruption	1
10. Vaccinia reaction	1
11. Condyloma accuminata	1
C. Bacteria—108	
1. Infectious eczematoid dermatitis	33
2. Recalcitrant pustular eruption of hands	17
3. Acute infection with cellulitis	14
4. Acne varioliformis	9
5. Hidradenitis suppurativa	9
6. Paronychia	4
7. Superficial ulceration of tongue	4

C. Bacteria (continued)

8. Chalazion	3
9. Sycosis barbae	3
10. Conjunctivitis	2
11. Imgetigo	2
12. Chronic recurrent bacterial infection	2
13. Folliculitis	2
14. Pilonidal sinus	2
15. Granuloma pyogenicum	2

D. Yeasts—8

1. Perlèche	4
2. Erosio interdigitalis	2
3. Vaginitis	1
4. Paronychia	1

E. Spirochetes (Treponemes)—2

1. Congenital syphilis	1
2. Secondary syphilis	1

F. Chlamydozoaceae—1

1. Trachoma	1

It was both surprising and interesting to note that "Diseases Due to Infections" are the most important as far as presenting problems in diagnosis and treatment in the nonoccupational group. In addition, from the standpoint of incidence, the fungi, bacteria, and viruses are of about equal importance. Under the viral diseases of skin, clinical diagnoses are listed—these without regard to the fact that many of the diseases are caused by the same virus. In these situations, the history, location and appropriately stained smears of the vesicle's base are all invaluable aids in helping one make a diagnosis.

The one case listed under Chlamydozoaceae, that of trachoma, was of considerable interest because of its public health aspects.

II. Diseases Due to Contact With External Agents—243

A. Contact dermatitis	
1. Sensitization type	184
2. Primary irritant type	16
3. Unclassified	43

III. Diseases Due to Disorders of the Sebaceous Glands—173

A. Seborrheic dermatitis	87
B. Acne vulgaris	52
C. Sebaceous cyst	21
D. Rosacea	10
E. Acne conglobata	2
F. Sebaceous hyperplasia	1

IV. The Eczema Group—149

A. Eczematous allergy	104

Lesions noted with this entity ordinarily occur in patients with a background of atopy. Lesions consist of eczematous patches of dermatitis occurring chiefly on the skin of the dorsal aspect of the hands, fingers or feet. Microscopically, the lesions show spongiosis, which suggests an underlying antigen-antibody mechanism. However, additional confirmatory findings are available through careful correlation with the history, intradermal skin tests, ruling out possibility of contactants, and response to desensitization—all were included in establishing this category. For a more detailed discussion of this entity, reference is made to the following articles: Jillson, O., and Adami, M.: Allergic Dermatitis Produced by Inhalant Molds, *A.M.A. Arch. Dermat.* 72:411-419 (Nov.) 1955; Jillson, O., and Piper, E.: Inhalant Allergens in Dermatitis, *A.M.A. Arch. Dermat.* 71:436-440 (April) 1955, and Lobitz, W. C., Jr., and Jillson, O. F.: Anecdotes of an Agnostic Allergist, *A.M.A. Arch. Dermat.* 78:458-474 (Oct.) 1958.

B. Atopic dermatitis (disseminated neurodermatitis)	45
1. Mild	35
2. Severe	10

V. Diseases Due to Neuroses—163

A. Neurodermatitis, localized	127
B. Neurotic excoriations	15
C. Dyshidrosis	13
D. Fox-Fordyce disease	3
E. Neurodermatitis, exudative	1
F. Glossodynia	1
G. Dermatitis facticia	1
H. Trichotillomania	1
I. Onychotillomania	1

VI. Dermatologic Evaluation—175

What is meant by the term "dermatologic evaluation"? There are several types of cases included in this category. A major function of the dermatologist is the evaluation of a particular skin problem in relation to a particular job. Can the employee continue safely on his present job with precautions and treatment as outlined by his personal physician? Would indicated treatment be acceptable, product-wise?

So-called "dust-free" work areas are required for the production of special optical equipment. This excludes persons with excessive dandruff and scaly dermatoses such as psoriasis or moderate to severe ichthyosis. It also excludes persons who are being treated for dermatitis with shake lotions or medicated powders. Borderline cases are referred to the dermatologist for an opinion which only follows a careful evaluation.

There are a number of perfectly good agents, such as mercurial or sulfur ointments, quartenary ammonium compounds, Thorium-x, and gentian violet, available for treatment of specific skin disorders; however, these agents desensitize photographic materials. Thus, persons being treated with these agents are often referred to the medical department by plant

supervision. Eventually, most of these people reach the dermatologist for evaluation. Use of these medications is discussed with the patient's personal physician. Oftentimes a substitute effective medication can be found. If this is not possible, the patient must be temporarily removed from direct or indirect contact with photographic materials until the course of treatment can be completed.

A second important type of case included in this category consists of those patients who present some systemic disease or allergic disorder where certain immunological procedures are in order. Antigens are available for intradermal skin testing to trichinosis, histoplasmosis, blastomycosis, coccidiomycosis, and tuberculosis. Additional antigens are available for dust, pollens, molds, epidermoids, and other inhalants. Special antigens are made from time to time if an offending dust from a particular work area is suspected of being the causative or aggravating agent in cases of allergic rhinitis or asthma.

VII. Congenital Diseases—78
- A. Nevi (Predominately dermocellular) 31
- B. Icthyosis vulgaris 25
  - 1. Mild 18
  - 2. Severe 7
- C. Keratoderma palmaris 8
- D. Von Recklinghausen's disease 6
- E. Port Wine stain 4
- F. Hippocratic nails 2
- G. Sturge-Weber disease 1
- H. Xeroderma pigmentosum (mild) 1

VIII. New Growths—56
- A. Benign 24
  - 1. Seborrheic keratosis 14
  - 2. Lipoma 7
  - 3. Skin papilloma 2
  - 4. Trichoepithelioma 1
- B. Malignant 32
  - 1. Basal cell epithelioma 12
  - 2. Senile keratosis 8
  - 3. Leukoplakia 4
  - 4. Lymphoma 4
  - 5. Squamous cell carcinoma 2
  - 6. Malignant melanoma 2

IX. Diseases Due to Drugs—53
- A. Dermatitis medicamentosa 42
- B. Fixed drug eruption 6
- C. Serum sickness 4
- D. Vaccine reaction 1

X. The Erythema Group—33
- A. Erythema multiforme 23
- B. Toxic erythema 8
- C. Erythema chronica migrans 1
- D. Erythema nodosum 1

XI. The Urticaria Group—31
- A. Urticaria 26

XI. The Urticaria Group (continued)
- B. Angioneurotic edema 5

XII. Diseases Due to Trauma and Physical Agents—30
- A. Telangiectasia 6
- B. Foreign body granuloma 6
- C. Sun sensitivity reaction 5
- D. Contusion 4
- E. Subungual hematoma 3
- F. Excessive callus formation 2
- G. Milia 2
- H. Thermal burn 1
- I. Fracture blister 1

XIII. Diseases Due to Circulatory Disturbance—16
- A. Stasis dermatitis 7
- B. Symmetric lividity of soles 6
- C. Capillaritis 2
- D. Thrombophlebitis 1

XIV. Disorders of Pigmentation—14
- A. Vitiligo 7
- B. Reticulated pigmentation of neck 2
- C. Hemosiderin pigmentation 2
- D. Chloasma 2
- E. Leuconychia 1

XV. Diseases Due to Disorders of the Eccrine Sweat Glands—13
- A. Hyperhidrosis-bromidrosis 7
- B. Miliaria rubra 5
- C. Miliaria crystallina 1

XVI. Metabolic and Nutritional Diseases—10
- A. Keratosis pilaris 3
- B. Xanthelasma 2
- C. Necrobiosis lipoidica diabeticorum 1
- D. Vitamin deficiency "B" group 1
- E. Angiectids of pregnancy 1
- F. Spider angiomata 1
- G. Palmar erythema 1

XVII. Diseases Due to Insects—8
- A. Insect bite reaction 8

XVIII. Miscellaneous—248
- A. Pityriasis rosea 63
- B. Psoriasis 62
- C. Lichen planus 23
- D. Dermatitis herpetiformis 17
- E. Furfuraceous impetigo 15
- F. Pruritus ani 12
- G. Granuloma annulare 11
- H. Lupus erythematosus 9
  - 1. Chronic discoid 8
  - 2. Subacute disseminated 1
- I. Alopecia areata 8
- J. Nodular subepidermal fibrosis 4
- K. Scleroderma 3
  - 1. Acrosclerosis 2
  - 2. Localized 1
- L. Chondrodermatitis nodularis chronica helices 2
- M. Benign lymphocytic infiltration of skin 2
- N. Spontaneous keloid 2

XVIII. Miscellaneous (continued)

O. Urticaria	2	U. Lichen sclerosis et atrophicus	1
P. Keratolysis exfoliativa	2	V. Sarcoid	1
Q. Aphthous stomatitis	2	W. Lichen spinulosis	1
R. Geographic tongue	1	X. Balanitis xerotica obliterans	1
S. Rheumatic nodule	1	Y. Psuedomucinous cyst	1
T. Sinus tract dental origin	1	Z. Dermatitis papulosa nigra	1

The remaining headings are self-explanatory. They do, however, indicate the variety of skin disorders seen in an industrial medical department.

Summary

Skin disorders referred to the dermatologist by the industrial physician are tabulated. The period of accumulation of cases extended over a four-year period. They represent cases coming from a total plant population of some 33,000 employees.

A schema of classification is presented to facilitate the industrial physician to categorize skin disorders. The cases present may be summarized as follows:

Sex	Total Cases Referred		Occupational		Nonoccupational	
	No.	%	No.	%	No.	%
....	2,370	100	618	26	1752	74
M	1,830	77	511	83	1319	75
F	540	23	107	17	433	25

Particular discussion is given to the occupational cases. Discussion of the nonoccupational cases is generalized.

The authors' address is Eastman Kodak Company, Rochester, N. Y.

THE DEPARTMENT OF INDUSTRIAL HEALTH
SCHOOL OF PUBLIC HEALTH

in cooperation with

THE INSTITUTE OF INDUSTRIAL HEALTH
UNIVERSITY OF MICHIGAN MEDICAL CENTER

offers

COURSES IN INDUSTRIAL HEALTH

Academic instruction leading to the Masters Degree in Public Health (Industrial Health) can be obtained in one year. An additional academic year is offered to the physician who has had his general internship and who desires to be qualified for an in-plant residency. This comprehensive plan is designed in accordance with requirements of the A.M.A. Council on Medical Education and Hospitals and the American Board of Preventive Medicine (Occupational Medicine).

First Year: Required courses include Epidemiology, Biostatistics, Public Health Administration, Environmental Health, and Industrial Hygiene. Electives in Radiological Health, Community Air Pollution, and Toxicology.

Second Year: Required courses in Clinical Medicine, Occupational Diseases, Industrial Health Research, and Mental Health. Electives over practically any field of specialization including Toxicology, Environmental and Radiological Health, Industrial Medical Practice, and Epidemiology.

A summer school course is included in the two year plan which consists of academic instruction in Ann Arbor and field work in Industrial Medicine at an industry.

Information relative to admission, fees, living expenses and housing, fellowships, scholarships and student aid will be furnished upon request from the Office of the Director, Institute of Industrial Health, 1630 University Hospital, Ann Arbor, Michigan.

Toxicology of the Fatty Acids

Edward V. Henson, M.D., South Charleston, West Virginia

THE ALIPHATIC or fatty acids series is probably nature's most ubiquitous group of open-chain compounds. The types of free fatty acids found in plants vary from relatively simple aliphatic acids to complex polycyclic compounds.[1] West and Todd[2] state that the acids known to be present in lipids vary in carbon content from C_2 to C_{34} and nearly always contain an even number of carbon atoms. Many of these acids belong to the saturated aliphatic series, while others contain from one to five double bonds. More recently, naturally occurring fatty acids containing triple bonds have been discovered (tariric acid). Oleic acid is the most abundant fatty acid found in nature and has been found in all natural fats. Several biologically important fatty acids contain 18 carbons. They are stearic, oleic, linoleic, linolenic, and ricinoleic acids, differing from one another by the presence of hydroxyl groups and the location and number of double bonds. Many of the unsaturated acids have a double bond between the ninth and tenth carbon atoms. The reasons for the natural repetitious occurrence of an even number of carbons in fatty acids, an 18-membered chain, and the location of unsaturation between carbons 9 and 10 are unexplained but probably are related to fundamental metabolic enzyme systems. Shorland[3] cites Hildrick as saying that with the solitary exception of isovaleric acid (found only in the depot fats of the dolphin and porpoise) the molecules of all natural straight-chain fatty acids, saturated and unsaturated, contain an even number of carbon atoms. Shorland then states that this opinion is not correct, for he has isolated *n*-pentadecanoic (15 carbons) and *n*-heptadecanoic (17 carbons) acids from natural fats. It would appear that Shorland's observation is the exception to the rule, for, although he has isolated acids with an odd number of carbon atoms, the even-numbered acids predominate in nature.

The industrially important aliphatic acids are the short- and medium-length chain members of the series. They are acidifying agents and intermediates in the manufacture of esters, plasticizers, plastics, synthetic fibers, solvents, varnish driers, adhesives, synthetic flavors, surfactants, lubricants, antiseptics, and pharmaceutical and agricultural chemicals.

Within the past few years fatty acids and their metabolism have become an important subject to the medical profession. The theoretical relationship of fats and their constituent fatty acids to cardiovascular disease has received wide attention in the professional and lay literature. Although the quantity and quality of fats ingested can be partially controlled by dietary selection, their metabolic fate, being a species characteristic, seems to be beyond individual control. Because of the wide distribution of fats in plant and animal tissues, it would seem to be impossible for a person to be on a fat-free diet.

Several unsaturated aliphatic acids which occur naturally have important nutritional functions. These are the so-called "essential" fatty acids. Eighteen-carbon linoleic acid contains two double bonds; 18-carbon linolenic acid has three double bonds; and 20-carbon arachidonic acid has four double bonds. Arachidonic acid is rated the most active in the prevention and treatment of fat deficiency symptoms in animals. It appears that most animals cannot synthesize these essential fatty acids.

Actions of the Fatty Acids

The responses elicited by the aliphatic acids vary considerably. The short-chained members in concentrated liquid form are corrosive to the body surfaces, and the vapors are extremely irritating to all mucous membranes. The long-chained members are much less irritating under the same conditions. Superficially, it would appear that the toxicity of the compounds de-

Dr. Henson is Plant Medical Director, Union Carbide Chemical Company.

The chemical information used throughout this article was obtained from Fieser and Fieser[4] and Richter.[5]

creases with increasing chain length. However, using the LD_{50} (the lethal dose for 50% of the animals tested) as the criterion of toxicity, we find that this is not true, for the fatal dose does not become larger with the chain length. To the contrary, although the dose change between succeeding members of the series is not uniform nor always in the same direction, the trend is toward a decrease in the LD_{50} with increasing chain length, indicating increasing toxicity. This, incidentally, is commonly observed in many homologous series. The above-mentioned apparent, but not real, decrease of toxicity among the higher members is probably related to the vapor pressure, water solubility, and other factors.

Larson et al.[6] studied several acids by their method for quantitatively evaluating the edema-producing potency of irritants on mucous membranes. Their technique consisted of instilling the material under study into the conjunctival sac of an anesthetized rabbit. Contact was maintained for three minutes, and then, in an hour, the animal was killed, and the upper palpebral conjunctiva of each eye was excised, weighed, dried, and reweighed. The edema-producing potency (EPP) was determined from the weights, the untreated eye being used as the control. Although the results were not definite in all individual instances, certain trends were observed. Among the monobasic acids, excepting formic, there was increasing EPP with increasing molecular weight. Unsaturation of monobasic and dibasic acids increased the EPP. Hydrochloric acid had no greater EPP than did the more weakly ionized monobasic organic acids. Solubility was a limiting factor in conducting some of the tests.

Samson et al.[7] studied the narcotic action of neutralized short-chain fatty acids and were able to produce unconsciousness in experimental animals. The amount of the fatty acid which will produce the response decreases with an increase in chain length. They also observed that the introduction of an —OH group into the molecule reduces the narcotic action. Peltier[8] observed that the toxicity of free fatty acids is a function of their chemical activity. Death following intravenous injection was caused by disruption of capillary endothelium from chemical action. He also stated that the toxicity of neutral fats and mineral oil was a function of their viscosity, for death from intravenous injection was due to mechanical obstruction of the pulmonary vascular bed. Kaneda and Ishii[9] studied the toxicity or lack of nutritive value of highly unsaturated fatty acids. They stated that it has been widely accepted that the nutritive value of unsaturated fatty acids is depleted when the number of double bonds in the chain increases. When a diet containing highly unsaturated fatty acids protected against oxidation was administered to the test rats, normal growth of the rats was attained without evident retarding effects on their health. Rats which were fed acids from the same source but allowed to auto-oxidize had a retarded growth with a decrease in weight and depilation around their mouths and legs. All the animals died in the later course of the test. Many studies have been made of the absorption and distribution of fatty acids. Lossow,[10] using C^{14}-labeled fatty acids has shown that circulating acids, long- as well as short-chain, can be transported into the milk of the lactating rat without change in the chain lengths.

In 1947, Barnet[11] reported four cases with three deaths from toxic hepatitis and cerebral edema following the intramuscular injection and the use of suppositories of the bismuth salt of heptadiene carboxylic acid for the treatment of upper respiratory diseases. The deaths were attributed to the 8-carbon doubly unsaturated acid.

It is evident that fatty acids can cause significant damage to body tissues if present in sufficient concentrations. Exposures are usually limited by the irritation produced. Continued exposure to high concentrations will cause conjunctivitis and corneal edema with pain, lacrimation, and photophobia. The respiratory tract responds with increased nasal discharge, increased bronchial secretions, pulmonary edema, and chemical pneumonia if the exposure has been massive or prolonged. It is also evident that, since the fatty acids are in foods and are intricately involved in metabolic processes, the time-dose factor is very important in the animal response to these materials. Absorption can lead to acidosis if the dose exceeds the rate at which the body can metabolize the acids.

Dermatological changes have been observed in experimental animals when the diet lacked the essential fatty acids. The resistance of human skin to skin diseases may be related to dietary fats and fat metabolism. Richter[12] stated that a series of fatty acids are produced only in adults under the influence of hormones and are excreted in the sweat and sebaceous material. Children who do not produce these fatty acids are more readily subject to fungus diseases of the hair. According to that author, it was the deficiency in fats and the resulting lack of normal fatty acids in the skin which was responsible for the incidence of fungus hair diseases in adults in the war years. Currently, propionic acid and undecylenic acid are used in the treatment of fungus infections of

the skin. Octynoic and nonynoic acids,[13] both acetylenic acids, have fungistatic properties, but neither has effects comparable to the overall activity of undecylenic acid. Large oral doses of undecylenic acid have been advocated in the treatment of psoriasis, a disease which is thought by some to be the result of aberrant fat metabolism.

Sensitivity reactions to individual acids and to acids per se have been observed. Dermatitis venenata due to potassium undecylenate[14] has been reported, but such sensitization seems to be rare. Tuft and Ettilson[15] studied a male patient, treated for nasal allergy, asthma, and migraine, who for years was subjected to frequent outbreaks of oral canker sores. Application of citric acid crystals to the oral mucosa repeatedly produced the ulcer in the patient, but not in the controls. Mucous membrane contact tests with substances containing citric acid gave similar positive results. Likewise, tests with other weak organic acids contained in foods gave positive reactions to some of these, especially to acetic acid. This would appear to be an unusual mucous membrane response to acids as such, rather than to a specific molecule. Weil[16] presented a case of sensitization to acetic anhydride in which the reactions were of the eczematous type. Intradermal testing with several anhydrides and acids, including acetic and formic acids, in molar concentrations of 0.01 to 0.2 produced positive reactions of the wheal and flare type. This led the authors to conclude that the specificity of sensitization was directed to the acid rather than to the anion or the acetyl radical.

Chemistry of the Fatty Acids

The chemistry and the nomenclature of the fatty acids are much more complex than those of the hydrocarbons. The name "fatty" originally was given to the group because many of the earliest known members were found in animal or vegetable fats. These acids are organic compounds that contain a carboxyl group, $-C(=O)-OH$ (—COOH), and also are known as carboxylic acids. In general, they behave like weak inorganic acids, ionizing and undergoing neutralization and salt formation with bases. These acids can be monobasic, dibasic, tribasic, or polybasic, depending upon the number of replaceable acid hydrogens present. This number is naturally determined by the number of carboxyl groups in the molecule.

Four methods are used to name the members of the saturated aliphatic monobasic acid homologous series with the general formula $C_nH_{2n}O_2$:

1. The Geneva system uses the aliphatic hydrocarbons as a base to which is added the suffix -oic acid. Thus methane, ethane, propane, and butane are altered to methanoic acid, ethanoic acid, propanoic acid, and butanoic acid.
2. When the carboxyl group (—COOH) is considered the functional group, it can be added to the parent aliphatic hydrocarbons, yielding methanecarboxylic acid, ethanecarboxylic acid, and propanecarboxylic acid. It should be noted that this adds an additional carbon to the molecule, so that propanecarboxylic acid corresponds to butanoic acid and not to propanoic acid.
3. Another common system of nomenclature, used particularly for the higher homologues, considers the compounds as substituted acetic acid derivatives. Methylacetic and ethylacetic acids are then synonymous with propanoic and butanoic acids.
4. Probably the most commonly used method of identification is by the trivial or common names of the acids. Many of the acids were known prior to the development of a systematic nomenclature and were given names denoting the source of their origin. The following are examples of the common names, number of carbons, and their derivations:

Formic acid	1 C	Formica (ant), Latin
Acetic acid	2 C	Acetum (vinegar), Latin
Propionic acid	3 C	First acid, Greek. It is the first acid which can be precipitated from solution.
Butyric acid	4 C	Butterfat.
Valeric acid	5 C	Valerian root.
Caproic acid	6 C	Caper (goat), Latin
Caprylic acid	8 C	These "goat" acids are found
Capric acid	10 C	in the butterfat of goat's milk.
Palmitic acid	16 C	Palm oil.

With the aliphatic acids as with other organic homologous series, a commonly observed molecular arrangement is isomerization (isomers are compounds of the same class which are made up of the same number and kinds of atoms differently arranged). It can be readily noted that butanoic and 2-methyl propanoic acids are isomeric, having the same basic composition, $C_4H_8O_2$. Although they are identical in molecular weight, these compounds are separate entities, being identified by their different physical and chemical properties.

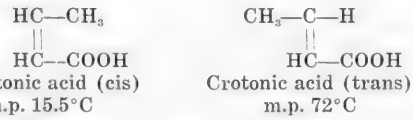
All the saturated acids up to and including those with 10 carbons are liquids at ordinary temperatures, whereas the higher members are solids. The melting points increase with the chain length but do not show a regular increase, for the melting point of the odd-numbered carbon acids are slightly lower than the next lower even-numbered acids. The following illustrates this:

Number of carbons	8	9	10	11	12	13
Melting point, °C	16.5	12.5	31	28	44	40.5

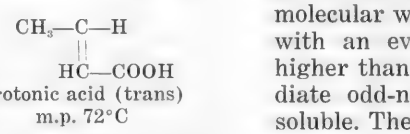
Except for acetic acid, all of the acids are lighter than water. The short-chained members, like acetic and butyric acids, are water-soluble, and the solubility decreases with the length of the chain, so that above 10 carbons the acids are insoluble in water.

Unsaturated fatty acids, or ethylenic acids, are usually identified by their common names. All the naturally occurring unsaturated acids are liquids at room temperatures and generally they are insoluble in water. The location and number of the unsaturated bonds alter the melting points considerably. One listing[4] of 10 different 18-carbon unsaturated acids showed melting points varying from 13°C to 86°C. The position of unsaturation can be located by the use of Greek letters, the first carbon after the carboxyl group being the alpha (α) carbon. Numbers can be used to designate positions in the molecule, in which case the carboxyl carbon is the first carbon. For example, crotonic acid, C—C=C—COOH, can also be called 2-butenoic acid, but-2-enoic acid, α,β-butenoic acid, or β-methylacrylic acid.

Crotonic acid is one of the many unsaturated and cyclic organic compounds which manifest geometrical isomerism. With ordinary isomers, the difference in the compounds results from variations in the locations of unsaturation or the locations and lengths of side chains. Geometrical isomerism is explained on the basis of different spacial relationships of the atoms in the molecule, giving rise to cis and trans forms. There is a difference in the melting point (m.p.), solubility, and acidity of the two forms. The cis and trans forms of crotonic acid are shown below:



Isocrotonic acid (cis) m.p. 15.5°C



Crotonic acid (trans) m.p. 72°C

Generally the trans form of isomers is more stable and has a higher melting point. However, the boiling points do not follow any simple rule.

Because of the presence of two active functional groups, the carboxyl radical and unsaturation, the short-chain unsaturated acids are so reactive that they do not occur free in natural products. One authority[4] states that acids with fewer than 10 carbons have not been observed in nature, and the C_{10} to C_{14} group occur only infrequently. Because of this reactivity, several of the short-chain acids have great industrial importance in chemical processes. An example is acrylic acid, which is used extensively in the manufacture of acrylate plastics.

The polybasic acids contain more than one carboxyl group (—COOH), which determines the number of replaceable acid hydrogen atoms in the molecule. The dicarboxylic acids with the two carboxyl groups on the opposite ends of the carbon chain are the most common and important industrially, and many of them occur in nature. The common names of the members of this series are used almost to the exclusion of a systematic nomenclature. The Geneva system of nomenclature uses the suffix -dioic acid for dicarboxylic acids, and -trioic acid for tricarboxylic acids, etc. Locations of substitutions can be identified by Greek letters with the alpha carbons being next to the carboxyl carbons. Multiple substitutions with proximity to the different acid radicals are located by the use of α, α', β, β', γ, γ', etc. The trivial names often indicate the Latin or Greek derivation of the original source of the acids. Oxalic acid occurs in plants of the Oxalis group; succinic acid is found in amber (Latin, succinum); adipic acid was obtained from the oxidation of the unsaturated acids in lard (Latin, adeps); and suberic acid was isolated by the oxidation of cork (Latin, suber).

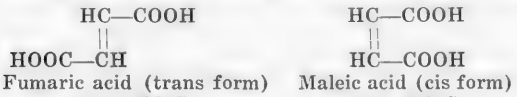
The following illustrates the relationship of the chemical structure, common name, and Geneva name of several of the common dicarboxylic acids:

HOOC—COOH	oxalic acid	ethanedioic acid
HOOC—C—COOH	malonic acid	propanedioic acid
HOOC—$C_{2,3}$—COOH	succinic acid	butanedioic acid
HOOC—$C_{2,3}$—COOH	glutaric acid	pentanedioic acid
HOOC—C_4—COOH	adipic acid	hexanedioic acid

The dicarboxylic acids are crystalline solids at room temperature and of higher melting points than monocarboxylic acids of comparable molecular weights. The melting points of those with an even number of carbon atoms are higher than the melting points of the intermediate odd-numbered acids, and are also less soluble. The reason for this is the fact that the internal crystal structure of the acids differs from even- to odd-numbered acids. The odd-numbered and the even-numbered acids follow no progressive series, and this also depends on the crystalline structure.

The unsaturated dicarboxylic acid series as a group follows the same general principle of structure as the ethylenic acids and dicarboxylic acids. The homologous series has multiplicity and different locations of unsaturation, but the two carboxyl radicals are usually located at the ends of the molecule. The common acids listed in this group are fumaric (C_4), maleic (C_4), mesaconic (C_5), citraconic (C_5), trans-glutaconic (C_5), and cis-glutaconic acids (C_5).

Fumaric and maleic acids are classical examples of geometrical isomerization, for although they have the same basic formula, HOOC—C=C—COOH, they are not related by nomenclature and have different chemical and physical properties. They are often represented as follows:



Fumaric acid (trans form) m.p. 287°C

Maleic acid (cis form) m.p. 138°C

The anhydride of maleic acid is formed quite easily by dehydration. Fumaric acid resists dehydration, and when sufficient force is applied, the anhydride of maleic acid is formed, indicating that the stress has changed the spacial arrangement in the molecule. Upon hydrogenation of the unsaturated bond, both yield succinic acid, which has no geometrical isomers.

Formic Acid

Formic acid, HCOOH, formylic acid, methanoic acid, the first member of the monobasic aliphatic acid series, boils at 100.7°C, is soluble in water, and is a colorless liquid having a very pungent odor. It was first isolated by distilling crushed ants and is found uncombined in stinging nettles and bees. Structurally, formic acid is not only the simplest of the carboxylic acids but also has some properties of an aldehyde ($-C^{=O}_{-H}$). This unique molecular arrangement makes it chemically somewhat different from the other members of the series.

Industrially, formic acid is used to manufacture formates and esters, is a food preservative and a coagulant of rubber latex, and used as an acid in dye baths in the textile industry. Its strong bactericidal properties are utilized in the tanning and brewing industries.

The primary physiological characteristic of formic acid is its irritating action on the mucous membranes, which action usually protects employees from excessive exposure. Irritation of the eyes, nose, throat, and upper respiratory tract is accompanied by lacrimation, nasal discharge, discomfort of the throat, and coughing. Skin contact with concentrated solutions causes severe skin irritation and blistering.

Solmann[17] relates some interesting comments from other authors about the use of formic acid around 1900 as an "elixir of youth." The observed results would now be classified as a psychosomatic response to placebo therapeusis. He stated that Libbin gave men 0.5 gm of the acid per kilogram of body weight daily for four weeks without ill effect. In rabbits, continued administration of formic acid damaged the kidneys (damage unspecified). Rats fed formic acid in their drinking water in concentrations of 0.01% to 0.25%, corresponding to a daily dosage of 0.2 cc of acid per kilogram, showed no effect on growth, appetite, or consumption of fluid. Concentrations of 0.5% in the drinking water, 0.35 cc of acid per kilogram, depressed the appetite and animal growth but not the fluid consumption.

Acetic Acid

Acetic acid, CH_3COOH, ethanoic acid, has a molecular weight of 60.05, boils at 117.9°C, and freezes at 16.6°C. Pure or "glacial" acetic acid freezes at 17°C, and its melting point is so depressed by small quantities of water (1% water lowers the melting point 2.16 degrees C) that impure acid is recognized readily. Acetic acid occurs naturally in ethercal oils and soured fruit juices and is the sour principle of vinegar, in which it is present in the concentration of about 4 to 5%. It is made by fermentation oxidation of dilute alcoholic liquors by the "mother of vinegar," the active agent being Mycoderma aceti. It is also produced by the distillation of wood (hence the name pyroligneous acid) and catalytically from acetylene and ethanol. It has extensive industrial use as a solvent, acidifying agent, and esterifying agent, in cellulose acetate production, and as a chemical intermediate.

Acetic acid is a normal product of carbohydrate and fat metabolism. The acid with a tagged carbon has been followed in human metabolism in the formation of body fat and glycogen and is a fundamental molecule in cholesterol synthesis. Dilute acetic acid is absorbed through the intestinal wall, and absorption from the pylorus-ligated rat stomach showed a log-dose relationship.[18]

Allergic responses have been observed following the ingestion of foods containing acetic acid. Wiseman and Adler[19] reported a case history of a patient who was apparently cured of recurrent cold urticaria and mucous membrane hypersensitivity to cold of four years' duration by the avoidance of foods containing acetic acid. Ingestion of a placebo followed by ice cream produced no mucous membrane response. When a minute quantity of acid was added to the placebo and the ingestion was followed by ice cream, pharyngeal edema quickly developed. Direct skin testing with 0.1% pure acetic acid was negative, but when an ice cube was placed over the test site for 15 minutes an urticarial reaction developed. Similar testing in normal control subjects gave negative results.

The oral LD_{50} for acetic acid is 3.53 gm per kilogram.[20] Solmann[17] reported that acetic and formic acids behaved approximately quantita-

tively alike. The figures have been recorded in the discussion of formic acid. The lower doses were without effect, while at 0.5% the appetite and growth of the animals were depressed.

The threshold limit for acetic acid is 10 ppm[21] and 800 to 1,200 ppm cannot be tolerated for longer than three minutes.[22] When one considers the marked conjunctival, mucous membrane, and cutaneous irritation which concentrated acetic acid is capable of causing, industrial intoxication occurs with surprising infrequency. Five employees exposed up to 12 years to 26 to 75 ppm during much of the day and as high as 260 ppm at peaks have been studied.[23] The skin of their hands was blackened, thickened, and fissured, the conjunctiva hyperemic, and the pharynx congested. Chest examinations showed evidence of chronic bronchitis. The teeth were eroded and blackened in spots. Although indefinite gastric symptoms were present, except for the above, the men appeared healthy. Apparently the irritating properties of acetic acid solutions and vapors serve as adequate warning to workers, and injuries do not occur except from accidental splashes or when escape from high concentrations is not possible. Skin burns result from the corrosive action of the acid. The respiratory effects are similar to those of formic acid. Acetic acid is said to be less irritating than formic acid.

This acid in 5% concentration is bactericidal to many types of organisms. Occasionally it is used on the skin in the treatment of superficial infections caused by Ps. pyocyaneus.

Oxalic Acid

Oxalic acid, ethanedioic acid, HOOC—COOH.-$2H_2O$, the first of the dibasic or dicarboxylic acids, is a colorless crystalline material which contains two molecules of water of hydration. Of the many foods which contain oxalates, rhubarb is particularly rich in the substance. A normal person excretes 10 to 30 mg per 24 hours, and many urinary calculi are composed of calcium oxalate.

Oxalic acid has considerable industrial use in bleaching textiles, straw hats, leather, cork, and furniture, and is found in ink and rust eradicators, and metal polish formulations.

Although this acid has a bitter taste, it resembles magnesium sulfate (Epsom salts) in appearance, and harmful doses have been ingested in error. The acute fatal oral dose may be as small as 5 gm, and death may follow in one hour. Vomiting may occur, followed by physical collapse, convulsions, and death. The convulsions are attributed to the immobilization of the body's ionized calcium. Damage of the renal tubules is found on microscopic section. Chronic toxic effects from the acid were not observed in rats fed a diet containing 1.2% of oxalic acid for two years.[24]

Schwartz[25] reports that oxalic acid causes gangrenous ulcerations of the skin. The nails turn blue and may fall off. Klauder[26] reported that contact with a 5% to 10% solution caused tingling and pain of the fingers with a purplish-red discoloration of the skin resembling a stain. Dermatitis was not present. He did patch tests on normal people, using a 7% solution, with negative results. A saturated solution gave skin irritation in 8 of 10 subjects. (A saturated solution would be about 10%, depending upon the temperature.)

Maleic Acid

Maleic acid, toxilic acid, HOOCCH=CH COOH, is an important industrial unsaturated dicarboxylic acid. It is used in the manufacture of resins.

Maleic acid is extremely irritating to all mucous membranes. Instillation of 1% and 5% solutions into the conjunctival sacs of the eyes of rabbits caused cloudiness of the cornea, hyperemia of the conjunctiva, and edema of the nictitating membrane within a few minutes. The eyes treated with the 1% solution were normal the next day. The irritation by the 5% solution was more intense, and the iris was also involved. Recovery was delayed for six or seven days.[27] Two-year feeding tests by Fitzhugh and Nelson[24] demonstrated toxic effects from 0.5% or more maleic acid, 1% retarding the growth rate. One per cent or more in the diet caused pathological changes in the proximal convoluted tubules of the kidneys and atrophy of the liver and testes. The depressed rate of growth may explain partially the latter findings. The Harrisons[28] produced glycosuria, phosphaturia, and aminoaciduria by daily giving rats 1 ml of 0.1 molar maleate per 100 gm of body weight for two to three weeks. There was no evidence of permanent renal damage. It was thought the effect was caused by impairment of renal tubular reabsorption of those materials. The same triad of findings appears in Fanconi's syndrome. Kiga et al.[29] secured positive results of enhancement of radiobiological effects by malonic and maleic acids. They stated that maleic acid does not specifically inhibit succinic dehydrogenase, but it is a universal inhibitor of sulfhydryl enzymes.

Fumaric acid, the geometric isomer of maleic acid, is much less toxic. The two-year feeding study previously mentioned indicated that 1.5% fumaric acid in the diet gave changes similar to 0.5% maleic acid. Fumaric acid is said to be physiologically inert and has been

proposed as a substitute for tartrates in laxatives.

Tartaric Acid

Tartaric acid, HOOC CH(OH) CH(OH) COOH, is one of the dihydroxy dicarboxylic acids which occur naturally. Fitzhugh's[25] studies showed it to have about the same chronic toxic effects as oxalic acid. Since tartrates are absorbed with difficulty from the intestinal tract, the salts of the acid are often used as saline cathartics.

The surface action of tartaric acid dust has been observed by Elsbury,[30] who described erosion of the teeth of girls working in an atmosphere containing a mixture of tartaric acid, sucrose, magnesium sulfate, and sodium bicarbonate. It is estimated that 1.1 mg per cubic meter of free tartaric acid produces clinical erosion of the teeth which can be detected after an exposure of six months.

Comment

The local and systemic actions of the acids, their chemistry and representative members of each group have been discussed. The primary ill effect is surface irritation from concentrated solutions and vapors. Systemic intoxication is rare and occurs only when the metabolic processes are over-taxed. Local and systemic sensitivity reactions to specific acids and to acids generally have been observed, but these reactions also are unusual.

Dr. Henson's address is Union Carbide Chemical Company, South Charleston 3, W. Va.

References

1. Buch, M. L.: Bibliography of Organic Acids in Higher Plants, U. S. Department of Agriculture, Agricultural Research Service (ARS-73-18), Oct., 1957.

2. West, E. S., and Todd, W. R.: Textbook of Biochemistry, Ed. 2, New York, The Macmillan Company, 1956.

3. Shorland, F. B.: Occurrence of Fatty Acids with Uneven-Numbered Carbon Atoms in Natural Fats, *Nature, London* 174:603, 1954.

4. Fieser, L. F., and Fieser, M.: Organic Chemistry, Boston, D. C. Heath & Co., 1944.

5. Richter, G. H.: Textbook of Organic Chemistry, Ed. 3, New York, John Wiley & Sons, Inc., 1952.

6. Larson, P. S.; Finnegan, J. K., and Hagg, H. B.: Observations on the Effect of Chemical Configuration on the Edema-Producing Potency of Acids, Aldehydes, Ketones and Alcohols, *J. Pharmacol. & Exper. Therap.* 116:119-122, 1956.

7. Samson, F. E., Jr.; Dahl, N., and Dahl, D. R.: A Study of the Narcotic Action of the Short Chain Fatty Acids, *J. Clin. Invest.* 35:1291, 1956.

8. Peltier, L. F.: Fat Embolism: III. The Toxic Properties of Neutral Fat and Free Fatty Acids, *Surgery* 40:665, 1956.

9. Kaneda, T., and Ishii, S.: Nutritive Value or Toxicity of Highly Unsaturated Fatty Acids, *J. Biochem.* 41:3, 1954.

10. Lossow, W. J., and Chaikoff, I. L.: Secretion of Intravenously Administered Tripalmitin-1-C^{14} and Octonote-1-C^{14} into Milk of the Lactating Rat, *J. Biol. Chem.* 230:149, 1958.

11. Barnet, R. N.: Reactions to a Bismuth Compound: Toxic Manifestations Following the Use of the Bismuth Salt of Heptadienecarboxylic Acid in Suppositories, *J.A.M.A.* 135:1, 1947.

12. Richter, R.: The Clinical Picture of the Fungus Diseases of the Scalp as an Individual Reaction, *Arztl. Forsch.* 3:557, 1949; *Chem. Zentrbl.* II, 1834, 1950. (*Chem. Abstra.* 46:11402, 1952.)

13. Hudak, E. S.; Mercer, B. D., and Wotiz, J. H.: Fungistatic, Bacteriostatic and Amebicidal Studies on the Isomeric Normal Nonynoic Acids, *J. Am. Pharmacol. A.* 45:327, 1956.

14. Rogers, S. I., and Shatin, H.: Dermatitis Venenata Due to Potassium Undecylenate, *A.M.A. Arch. Derm. & Syph.* 66:289, 1952. (Indust. Hyg. Dig. 968, Sept., 1952).

15. Tuft, L., and Ettilson, L. N.: Canker Sores from Allergy to Weak Organic Acids (Citric and Acetic): Case Report and Clinical Study, *J. Allergy* 27:536, 1956.

16. Weil, A. J., and Rogers, H. E.: Allergic Reactivity to Simple Aliphatic Acids in Man, *J. Invest. Dermat.* 17:227, 1951.

17. Solmann, T.: Studies of Chronic Intoxications on Albino Rats. III. Acetic and Formic Acids, *J. Pharmacol. & Exper. Therap.* 16:463, 1921.

18. Herting, D. C.; Embree, N. D., and Harris P. L.: Absorption of Acetic Acid and Glycerol from the Rat Stomach, *Am. J. Physiol.* 187(2):224, 1956.

19. Wiseman, R. D., and Adler, D. K.: Acetic Acid Sensitivity as Cause of Cold Urticaria, *J. Allergy* 27:50, 1956.

20. Smyth, H. F.; Carpenter, C. P., and Weil, C. S.: Range Finding Toxicity Data: List IV, *A.M.A. Arch. Ind. Hyg.* 4:119, 1951.

21. Threshold Limit Values for 1958, *A.M.A. Arch. Indust. Health* 18:178, 1958.

22. Patty, F. A. (Editor): Industrial Hygiene and Toxicology, Vol. II, New York, Interscience Publishers, Inc., 1949.

23. Parmeggiani, L., and Sassi, C.: Health Injuries Caused by Acetic Acid in the Production of Cellulose Acetate, *Med. Lavoro* 45:319, 1954. (*Indust. Hyg. Dig.* 66, Jan., 1955.)

24. Fitzhugh, O. G., and Nelson, A. A.: The Comparative Chronic Toxicities of Fumaric, Tartaric, Oxalic and Maleic Acids, *J. Am. Pharmacol. A.* 36: 217, 1947.

25. Schwartz, L.; Tulipan, L., and Peck, S. M.: Occupational Diseases of the Skin, Philadelphia, Lea & Febiger, 1947.

26. Klauder, J. V.; Shelanski, L., and Gabriel, K.: Industrial Uses of Fluorine and Oxalic Acid Compounds, *A.M.A. Arch. Indust. Health* 12:412, 1955.

27. Winter, C. A., and Tullius, E. J.: The Irritating Effects of Maleic Acid and of Maleic Anhydride upon the Eyes of Rabbits, *Am. J. Ophthalmol.* 33:387, 1950.

28. Harrison, H. E., and Harrison, H. C.: Experimental Production of Renal Glycosuria, Phosphaturia and Aminoaciduria by Injection of Maleic Acid, *Science* 120:606, 1954.

29. Kiga, M.; Ando, Y., and Koike, H.: Enhancement of Radiobiological Effect by Malonic and Maleic Acids, *Science* 122:331, 1955.

30. Elsbury, W. B.; Browne, R. C., and Boyes, J.: Erosion of Teeth Due to Tartaric Acid Dust, *Brit. J. Indust. Med.* 8:179, 1951.

Editorials

Silicosis, a Disease of Autoimmunity

Although it is recognized that many great scientific discoveries have been serendipitous, i.e., brought about accidentally by unforeseen circumstances, it would be a serious mistake to underestimate the contributions to scientific progress made by systematic, painstaking, analytical investigations. Such systematic investigations under the inspired guidance of Professor Vigliani of Milan, Italy, have scored a notable advance in our understanding of silicosis.

About 10 years ago, Vigliani noted an increase in the serum gamma globulins of many silicotic patients. This and other observations made in the same laboratory led to the concept that plasma proteins were responsible for the hyaline material in silicotic nodules. Corrobative chemical studies indicated that about 60% of the proteins of the hyaline silicotic tissue was identical with plasma proteins, mostly gamma globulins. Immunologic studies also confirmed the identity of the latter. This led to another logical hypothesis: that an antigen-antibody reaction was responsible for the precipitation of the gamma globulins upon the collagen fibers.

No direct evidence in support of this hypothesis is presented. However, some very interesting indirect evidence is furnished. This evidence is based, in part, upon histopathological observations and, in part, upon immunological data.

The development of silicosis, as envisioned by Vigliani, consists of four stages: The first involves phagocytosis of the crystalline silica particles; in the second, regressive changes in the phagocytic cells result in the formation of lipid-polysaccharide complexes which are liberated when the cells die and disintegrate; in the third stage, there is local and more general proliferation of reticuloendothelial tissue with a demonstrable increase in plasma cells and other pyroninophilic cells; in the fourth stage antibodies are produced which ultimately precipitate to form the hyaline substance in the center of silicotic nodules.

In support of the immunological hypothesis, Vigliani points not only to the high gamma globulin content of the hyaline silicotic tissue but also to the chemical similarities between silicotic hyaline and some fibrinoids of diseases like lupus erythematosus, rheumatic fever, and serum sickness, which are acknowledged to have an immunologic background. This hypothesis is buttressed by the demonstrated increase in plasma cells following the injection of crystalline silica in animals, inasmuch as the production of gamma globulin is believed to be a special function of plasma cells.

Vigliani believes that the lipid-polysaccharide complexes liberated by the disintegration of silica-containing phagocytes are autoantigenic and stimulate the formation of autoantibodies. Support for this belief is drawn from the observation that the serum of some silicotic patients will agglutinate the polysaccharide zymosan, derived from the cell wall of yeast cells.

The degeneration of silica-containing phagocytes is considered a prerequisite for the development of silicotic fibrosis, and an important experiment is described that not only gives some support to this claim but also disproves the solubility theory of silicosis.

Pernis and associates in Vigliani's laboratory embedded millipore-membrane capsules subcutaneously in rats. Twenty were empty and twenty others contained 50 mg of quartz each, with a particle size of 1 μ to 3 μ. The membranes of the capsules had a pore size of 0.3 μ and were therefore impermeable to the quartz particles, but they were permeable to tissue fluids and to the silicic acid derived from the dissolution of the quartz. After seven months no difference was found between the tissues

about the empty capsules and the tissues about the quartz-containing ones, even though the latter had lost about 8% of their quartz content.

Vigliani denies the possibility that quartz denatures proteins and thereby initiates the formation of connective tissue, as has been suggested. Nor does he believe that the collagen of the silicotic nodule is the specific, direct consequence of the "fibrogenic" action of silica, but, rather, he considers it to be a result of the reticuloendothelial immunologic reaction.

An interesting byproduct but, nonetheless, important feature of Vigliani's immunologic concept of silicosis concerns the peculiar, hitherto unexplained, synergism which exists between the pathologic effects of crystalline silica and a tuberculous infection. According to Vigliani's immunologic concept of silicosis, there is in this disease a considerable nonspecific stimulation of reticuloendothelial tissues which results in a greatly enhanced response to specific immunologic challenges. It is generally recognized that the presence of living tubercle bacilli or such dead organisms (as in Freund's adjuvants) in the living, susceptible host will also result in a similarly enhanced immunologic response to specific antigenic stimulation. Consequently, the synergism between the two diseases may now be logically explained as a reciprocal nonspecific stimulation which multiplies the respective specific immunologic responses.

Although Vigliani's concept of silicosis as a disease of autoimmunity has much experimental data to support many of the component parts of the concept, there are facets which, as Vigliani will also agree, are still in need of experimental verification. In the meantime, this new concept may give a better understanding of many features hitherto obscure, not only of silicosis but also of certain other pneumoconioses.—Guest editorial by PAUL GROSS, M.D.,

Changing the Guard

The forty-fourth annual meeting of the IMA, held last month in Chicago, marked a turning point in the Association's history. Dr. E. C. Holmblad, our veteran managing director, stepped out of that office, and his place was taken by Mr. Clark D. Bridges. The guard was changed, not necessarily an old guard for a new one, but rather one kind of guard for another kind.

Our situation is comparable with that of the small family business that grows and prospers. Fathers, sons, and brothers form a loose, informal association in which each member intuitively and with the implied consent of the others assumes a position he can best fill. In the easy relationships of the family the informal organization works well. Somewhere in the group is a natural manager. He may be a manufacturer or a salesman by personal preference, but he accepts the manager's role because this is expected of him. The business grows. The family components are increasingly separated by walls, floors, buildings, and finally, cities. There comes a day when the informally selected manager retires. After some soul-searching and perhaps some advice by respected outsiders, a decision is taken that the firm's direction will be given over to one of a rising generation known as professional managers — men who choose to look upon the function of management as an abstraction, an end in itself.

Clark Bridges is a professional manager—one of the really good ones. We know this directly from his performance as this journal's Publication Manager; and we know it indirectly from conversations overheard within the Association's elected officialdom. We congratulate him upon his appointment. We know he will do the job well. We hope he enjoys it.

Industrial Medical Association

THE PRESIDENT'S MESSAGE

D. JOHN LAUER, M.D.

JUST six weeks ago our annual meeting was completed in a highly successful manner. Of our 4,000 members, 21% were registered in attendance. Since we have added so many new members in the past several years, it might be well to review briefly the genesis and development of this important annual event of the Association's program.

In 1916 when the Association was organized, an annual meeting was its major educational feature. It was here that formal papers, committee reports and the opportunities to exchange ideas in industrial practice took place. As the Association grew, the annual meeting naturally took on greater prominence and influence.

In the late 1930's the Association began to recognize formally other professions and disciplines in the field of industrial health, and we saw a heartening enlargement of the horizon.

First a relatively small group of engineers and chemists who were then engaged in industrial hygiene activities met concomitantly with the physicians' group, and we had the nativity of the American Conference of Governmental Industrial Hygienists, and subsequently the American Industrial Hygiene Association. During World War II the industrial nurses established their organization as the American Association of Industrial Nurses, and were encouraged to meet with these groups. Some time after the war, the industrial dentists joined.

In 1951 the words "Industrial Health Conference" were first used in the minutes of these annual conferences.

Thus we saw evolved a unique Conference comprising five organizations with their varied disciplines and points of view, but with a unifying objective. Here was the opportunity for a broad attack on the problems that confronted those responsible for the health and well-being, on the job, of men and women at work. The papers and minutes of the years past frequently speak of "the team approach" to these problems.

Now, of course, this Conference has not been without its problems. As each organization matures, it tends to seek complete independence, and with this feeling comes the unfortunate urge to return to limited horizons of interest. In each group—the IMA as well as the others—there are those individuals who have resisted or been unhappy with having others than persons of their own specialties at the Conference. This monolithic attitude has tended to break out from time to time and become abrasive. At the recent Conference in Chicago, this drive for complete independence which has been evident in the AIHA took on formal expression.

While the IMA continues to manage the business aspects of the Conference, we have recognized the immense scientific value of the heterogeneity and have welcomed the other participating organizations into the general over-all planning. It is our hope that the full structure of the Conference can be preserved, and we are committed to a serious effort toward this goal. We work together in our respective industries. Why should it be necessary to meet separately?

Book Reviews

THE IMPACT OF THE PEACEFUL USES OF ATOMIC ENERGY ON STATE AND LOCAL GOVERNMENTS. Summary prepared and edited by Saul J. Harris. Price, $3.50. Pp. 92. Atomic Industrial Forum, Inc., 3 E. 54th St., New York 22.

This report illustrates the transitional stage which currently prevails in the atomic energy industry. The AEC, other federal agencies, and the states are actively establishing and reestablishing control programs as well as promoting atomic development. At the same time, standardization programs are being pursued vigorously by industry, professional societies, and national associations.

It is the effect of the interplay of these activities which is displayed in this summary report of a conference held at Columbus, Ohio, in October, 1958. The conference spotlighted the problems which the atomic energy industry presents to state and local officials. It points out available sources of information to assist in making reasonable and well-informed decisions on these problems.

This report begins by reviewing current trends in atomic technology. A series of papers describe the impact of atomic energy on state and local regulatory agencies and on industrial development programs. An interesting chapter summarizes the problems of atomic energy coordination at the state level by presenting the experiences of eight states which have utilized a state coordinator to prevent overlapping of governmental agencies and industry.

The National Industrial Council, U. S. Public Health Service, Atomic Energy Commission, and other current national programs which affect state and local atomic energy programs are described. The objectives and actions of interstate compacts are also discussed.

The major conclusion of the report is to emphasize the necessity for cooperation and coordination on a nationwide basis of all the many state, federal, and nongovernmental agencies having to do with atomic energy. It illustrates the multiple mechanisms in this country through which industry and government have cooperatively solved many problems created by advances in technology. The report expresses the hope that the ultimate objective should be, as much as possible, a single regulatory pattern with appropriate codes and standards.

—GEORGE L. VOELZ, M.D.

THE ATOMIC INDUSTRY 1958. Price, $1.25. Pp. 12. Atomic Industrial Forum, 3 E. 54th St., New York 22.

This pamphlet describes in succinct style the progress of industry in developing commercial applications of atomic energy during 1958. These activities are divided into two categories: (1) reactor activities and (2) nonreactor activities.

The first section describes the 38 nuclear reactors completed in this country and abroad, as well as the 45 reactors started in construction during 1958. Reactors previously completed are also described. It summarizes the basic type and power rating of these reactors, their location, the company responsible for design and construction, and date completed.

The second section depicts the uranium mills in the United States, the industrial applications of radioisotopes, and other industrial production supporting the atomic energy industry.

The expanding need for alert preventive industrial health programs, which recognize radiation protection fundamentals, is apparent in this report, which shows over 1,500 organizations using radioisotopes, including 186 companies added during 1958.

—GEORGE L. VOELZ, M.D.

STATE ACTIVITIES IN ATOMIC ENERGY. Compiled and edited by Saul J. Harris. Price, $3.00. Pp. 51. Atomic Industrial Forum, Inc., 3 E. 54th St., New York 22.

This survey indicates the increasing interest of states to promote as well as to regulate the development of atomic energy. The activity in each state and in 13 municipalities is reported by summarizing both regulatory and developmental actions. The regulatory actions include amendments of existing state laws to regulate atomic industry or radiation problems; adoption of radiation codes, rules, and regulations; appointment of advisory radiation committees; and court decisions relating to radiation hazards. The developmental actions include establishment of special study or advisory committees on atomic energy problems, appropriation of funds to finance nuclear development, appointment of a coordinator of atomic development activities, and atomic energy educational activities.

The extent of these activities is indicated by the fact that 30 states had established advisory committees as of June 1, 1958. In 13 states, a coordinator of atomic development activities is appointed or authorized. Registration of radiation sources is required in 14 states, and major legislation on registration is pending in 2 states. Seven states have adopted a comprehensive radiation code, and three others have legislation pending.

A brief section describes the assistance provided the individual states and cities through related activities of federal agencies, of special study groups, of national associations of state officials, of regional associations of states, and of national standards certifying bodies. References for model state statutes and codes related to atomic energy are listed.

The Atomic Energy Commission, by authority granted by the Atomic Energy Act of 1954, is regulating in an area which would normally fall under state jurisdiction because the unusual development and problems of the industry. State and local regulation is just beginning to unfold in this complex industry. Anyone with responsibility or interest in the developmental or regulatory activities in the atomic energy industry will find this a useful and convenient collection of information otherwise difficult to locate.

—GEORGE L. VOELZ, M.D.

Abstracts of Current Literature

Clinical Toxicology

Lee H. Miller, M.D., I.M.D.

Clinical Studies with Penicillamine in Hepatolenticular Degeneration. M. J. Seven,* B. Kliman, and R. E. Peterson. Am. J. M. Sci. 237:49, 1959. (*Dept. of Medicine, Hahnemann Medical College, Philadelphia 2)

Hepatolenticular degeneration is known to be associated with a high content of copper in many tissues, especially the brain and liver. In a patient afflicted with this disease, the authors noted a marked increase in urinary copper excretion on the first day of therapy with penicillin. Review of the probable in vivo breakdown products of penicillin suggested that penicillamine had a possible potential for serving as a complexing or chelating agent for heavy metals because of its single sulfhydryl group and adjacent carboxyl and amino groups.

As a result of these observations, two patients with hepatolenticular degeneration (HLD) and one with hemochromatosis were treated with penicillamine given orally. The urinary copper excretion of one patient following a 3 gm. dose of penicillamine rose to as much as 6 mg/24 hours as compared with the pretreatment average excretion of 0.551 mg. In the second patient, the copper excretion rose as high as 12 mg/24 hours following a 4 gm. dose of penicillamine while the pretreatment average excretion was 0.340 mg. After various trials, the optimum dosage appeared to be 0.5 gm q.i.d. every other day. Symptoms of anorexia, nausea, gaseous eructations, and drowsiness occurred with higher doses; however, no major signs of toxicity were noted with doses up to 5 gm daily. Of the patients with HLD, one showed dramatic improvement, while the other had a progression of the disease. The patient with hemochromatosis had a slight increase in urinary iron output following oral penicillamine therapy, which was as much as that observed following intramuscular penicillin.

Respiratory Pathophysiology in Chronic Beryllium Disease: Review of Thirty Cases with Some Observations After Long-Term Steroid Therapy. E. A. Gaensler,* J. M. Verstraeten, W. B. Weil, D. W. Cugell, A. Marks, J. B. Cadigan, R. H. Jones, and M. F. Ellicott. A.M.A. Arch. Indust. Health 19:132 (Feb.) 1959. (*818 Harrison Ave., Boston)

The objectives of this analysis were, "(1) definition of the respiratory physiologic disturbances in chronic beryllium disease with emphasis on evaluation of early disease or relatively asymptomatic patients; (2) comparison of various function tests, particularly carbon monoxide-diffusing capacity measurements, with other objective and with subjective findings; (3) evaluation of long-term steroid therapy in terms of physiopathologic changes, and (4) comparison of the pattern of respiratory abnormalities in chronic beryllium disease with that found in sarcoidosis."

The ventilatory function, mechanics of breathing, gaseous distribution, and lung volumes were normal in one-half of the patients that were studied. The other half had varying degrees of "restrictive" insufficiency, and evidence of minor airway obstruction was common. Blood gas analyses revealed low arterial oxygen tensions and incomplete oxygen saturation in all patients while at rest. The alveolar-arterial oxygen (A-a) gradient was elevated markedly when the patients breathed room-air and a low-oxygen mixture at rest and during exercise. The oxygen and carbon monoxide diffusing capacity was diminished in all but two patients during steady state conditions at rest and during exercise. A rise (of the same order of magnitude as that seen in normal subjects) in the diffusing capacity was demonstrated in all patients who were able to exercise. Following upon steroid therapy, moderate improvement of the ventilatory function occurred typically during the first year, but then returned to pretreatment values. Steroid therapy had no significant effect upon the A-a gradient or diffusing capacity, and the A-a gradient never fell below 20 mm Hg. The results from identical pulmonary function studies carried out on patients with sarcoidosis were similar to the results obtained from patients with chronic pulmonary beryllium disease. The authors conclude that the physiologic studies that were employed provided a satisfactory means for objective evaluation of the type and degree of pulmonary insufficiency and for objective assessment of the effect of treatment.

A Defect of Glutathione Metabolism in Erythrocytes from Patients with a Naphthalene-Induced Hemolytic Anemia. W. H. Zinkham* and B. Childs. Pediatrics 22:461 (Sept.) 1958. (*Department of Pediatrics, The Johns Hopkins University School of Medicine, Baltimore 5)

Hemolytic anemia occurs in a small percentage of infants and children after exposure to naphthalene by ingestion. The majority of cases of naphthalene-induced hemolytic anemia, however, have occurred in Negroes. Likewise, a similar type of anemia has occurred in a small percentage of American Negroes, following upon the administration of primaquine. Subsequently, a defect in the erythrocyte metabolism was demonstrated in persons who experienced the drug-induced hemolytic phenomenon. This defect was shown to be related to a low level of reduced glutathione (GSH) in the erythrocytes of the persons who were affected. Further, the defect in glutathione metabolism was related to a deficiency of glucose-6-phosphate dehydrogenase activity in the erythrocyte. Evidence obtained by studying red cells labeled with Fe^{59} suggests that the glutathione

metabolic defect occurs only in older erythrocytes. The condition is transmitted genetically. In addition to primaquine and naphthalene, nitrofurazone, vitamine K. analogues, and the fava bean are capable of causing hemolysis in persons with this defect. The GSH content of the erythrocytes of these persons is reduced when the erythrocytes are incubated with acetylphenylhydrazine (APH). It is believed that naphthalene itself is not injurious to the erythrocyte. On the other hand, the metabolites of naphthalene that are excreted in the urine (alpha-naphthoquinone, alpha-naphthol, beta-naphthoquinone, and beta-naphthol) have reduced the level of GSH in erythrocytes in tests. Evidence suggests that the naphthalene metabolites may pass through the placenta and into the fetal circulation, thereby causing hemolysis of the infant's erythrocytes.

The case histories of four patients who were afflicted with hemolytic anemia after exposure to naphthalene are presented. Defective glutathione metabolism was demonstrated in all of the cases. The methods used in the study as well as the results are presented in detail.

Noise and Hearing

Horace O. Parrack, Ph.D.

Sound-Level Surveys for Hearing Conservation. W. B. Snow.* Noise Control 5:13 (March) 1959. (*1011 Georgia Ave., Santa Monica, Calif.)

Once the decision has been made to institute a hearing conservation program, it is important immediately to evaluate the noise-exposure conditions in the plant by conducting an appropriate sound-level survey. In this article one experienced consulting engineer describes the equipment and procedures he uses in making a sound-level survey for hearing conservation. He considers and discusses various problems, as, for example, selection of test sites, reference levels, microphone placement, equipment, data recording, continuous sounds, impulsive sounds, tones, time factors, and the final report. He describes the special characteristics of a sound survey for hearing conservation and shows how one man carries out a survey he considers adequate. He concludes, "I hope these methods will simplify the task for others, and will stimulate them in turn to describe techniques which they have found useful."

Noise Characteristics of Some Jet Ground Operations. R. M. Hoover* and L. N. Miller. Noise Control 5:28 (March) 1959. (*Bolt, Beranek and Newman Inc., Cambridge, Mass.)

This paper contains data on the noise levels produced by two jet transport aircraft, the Caravelle and the Comet 4, during various ground operations. The Caravelle is equipped with two Rolls-Royce, RA-26, engines rated at 10,000 lbs. maximum thrust at 8,000 rpm. The Comet 4 is equipped with four Rolls-Royce, RA-29, engines rated at 10,500 lbs. maximum thrust at 8,000 rpm. The detailed noise level data are contained in 10 figures which show how noise levels on the airport vary in relation to various ground operations—taxi, idle, etc.—and also show ground noise resulting from take-off and climb-out operations. The data on the "over-all" noise levels (detailed in Figures 2 and 3) have been used to compute the "over-all" acoustic power level (PWL) for take-off conditions. The PWL for the Comet 4 is 174 db reference 10^{-13} watt and it is 173 db reference 10^{-13} watt for the Caravelle. The data in the 10 figures permit one to estimate the noise levels to which personnel are exposed when working at various places on the airport. To estimate the actual noise-exposure of personnel (which is expressed in terms of noise level and time spent in the noise) at any given airport, data on the number, type, and duration of the various aircraft operations must be gathered to supplement the data from the 10 figures of this article.

Observations on Temporary Auditory Threshold Shift Resulting from Noise-Exposure, I. A. Glorig,* A. Summerfield, and W. D. Ward. Ann. Otol. Rhin. & Laryng. 67:824 (Sept.) 1958. (*Research Center, Subcommittee on Noise, 111 N. Bonnie Brae St., Los Angeles 26)

An extensive study of the temporary auditory threshold shift (TTS) produced by varying the time of exposure to several types of noise was undertaken by the Research Center of the Subcommittee on Noise. The study was initiated with a pilot study: (1) to define the course of growth and recovery of temporary threshold shift for specific exposure conditions; (2) to determine whether the average temporary threshold shift of a group of subjects is stable when noise-exposure conditions are constant; (3) to describe the consistency of individual temporary threshold shifts when the repeated noise-exposures are the same; (4) to define the effects of short recovery periods on the cumulative threshold shift; and (5) to determine whether the threshold shifts for different frequencies are closely related. Some 99 persons, having normal hearing, were exposed under rigidly controlled conditions to a standard broad band noise (100 db re 0.0002 dyne cm^{-2}) in a room where the noise level remained constant within plus or minus 1 db when 0 to 6 persons were in the room. Hearing tests were made for frequencies of 1000, 2000, 3000, 4000, and 6000 cps, using a modified Rudmose, Békésy automatic audiometer.

One can conclude from the over-all study that temporary threshold shift is a stable phenomenon; therefore, a long-term investigation of the nature of TTS and its relation to permanent hearing loss is feasible. The amount of TTS produced by a given noise exposure shows wide individual variation. These individual shifts show a normal statistical distribution. The TTS resulting from exposure to a 100 db over-all level of broad band noise in-

creases linearly with the logarithm of the exposure time for the test frequencies from 1000 to 6000 cps.

Ears Can Be Protected. E. Guild.* Noise Control 4:305 (Sept.) 1959. (*Wright Air Development Center, Aero Medical Laboratory, Wright-Patterson Air Force Base, Ohio)

This article contains data to demonstrate that ear protectors are available on the market today that provide protection from noise-exposures that are likely to occur in military and industrial work environments. Difficulties in persuading workers to use the protective devices are discussed, as are the limitations of various types of protectors. Photographs show the standard protectors used by the U. S. Air Force. The performance of these devices is shown graphically in three figures. The standard AF Ear Plug attenuates sound (at various frequencies) as follows: 24 db attenuation at 125 and 250 cps; 26 db attenuation at 500 cps; 20 db attenuation at 1000 cps; 38 db attenuation at 2000 and 3000 cps; (at least) 35 db attenuation at 4000 to 8000 cps. The attenuation provided by the AF Ear Muff is 20 db attenuation at 125 cps; 22 db attenuation at 250 cps; 38 db attenuation at 500 cps; 37 db attenuation at 1000 cps; 32 db attenuation at 2000 cps; about 40 db attenuation at 3000 to 8000 cps. When the AF Ear Plug and AF Ear Muff are worn together, the combination gives (at least) 35 db attenuation at 125 and 250 cps; 40 db attenuation at 1000 and 2000 cps; (at least) 47 db attenuation at 3000, 4000 and 6000 cps; 40 db attenuation at 8000 cps.

Radiation Health

Thomas S. Ely, M.D.

Submarine Medicine on Nautilus and Seawolf. J. H. Ebersole. A. M. A. Arch. Indust. Health 18:200 (Sept.) 1958.

From the medical standpoint, nuclear submarine problems are not simply the old ones with the additional factor of ionizing radiation. The substitution of a fission reactor for an aerobic power source has enabled the submarine to remain out of contact with the atmosphere much longer than ever before. This fact alone has presented a new field of problems to the medical officer. In the non-nuclear area are such previously minor or nonexistent items as CO, CO_2, and refrigerant toxicity. Potential nuclear problems exist by reason of the proximity of the reactor to living spaces and food preparation spaces as well as working spaces, because of the fact that exposure is a 168 hours per week rather than 40 hours per week proposition and because the atmosphere is unavailable for dilution for long periods. In spite of the seeming difficulties, radiation exposure rates to the submarine personnel have averaged about 200 mrem per year with annual maxima of about 2000 mrem. While submerged, a substantial portion of the average reactor exposure is offset by the reduction in cosmic radiation.

Statistical Analysis of Reactor Safety Standards. E. Siddall.* Nucleonics 17:64 (Feb.) 1959. (*Atomic Energy of Canada, Ltd., Chalk River, Ont., Canada)

Rather than an endless struggle for more and more safety devices in reactor design, an optomization based on an objective statistical analysis is proposed. Despite emotional opposition, equating lives and dollars forms the most convenient analysis mechanism. Statistics show that this ranges from 0.93 million dollars per life for the automobile passenger to 200 million dollars per life for the automobile maker. Mining the fuel is much more hazardous than any subsequent step in converting either coal or uranium to electricity. Since fuel mining forms a much larger portion of the coal-produced kilowatt hour than the uranium-produced kilowatt hour, a net saving in human life would result from any nuclear conversion, and this provides the basis for a rational analysis of reactor safety measures. Money can always be spent to save lives. Beyond a certain point in reactor safety measures, the money would be better spent elsewhere.

Maximum Permissible Amounts of Natural Uranium in the Body, Air and Drinking Water Based on Human Experimental Data. S. R. Bernard. Health Phys. 1:288 (Dec.) 1958. (Committee on Mathematical Biology, The University of Chicago, 5741 Drexel Ave., Chicago 37)

The necessity of extrapolation from laboratory animal data to the human case limits confidence in derived maximum permissible doses. In 1948 results of a study of uranium toxicity of injected hospital patients was published, but no distribution data resulted since none of the patients came to autopsy. A study was initiated in 1953, which provided some of this missing information, because terminal brain tumor patients were selected. Injections of 4 to 50 mg. of uranium demonstrated that approximately equal amounts were concentrated in the skeleton and kidneys, the latter being the critical organ. Calculations of radiation doses reveal chemical toxicity to be the significant hazard. Consideration of the human data indicates a maximum permissible body content and maximum permissible concentrations in air and water lower than the values recommended by the NCRP and ICRP. Existing data still do not permit the calculation of maximum permissible concentrations of insoluble uranium in air as a function of particle size, and further experimentation on this point is recommended and outlined.

Assessing the Impact of Environmental Radiation on Total Health. S. Henshaw.* Health Phys. 1:141 (Sept.) 1958. (*Division of Biology & Medicine, U. S. Atomic Energy Commission, Washington 25, D. C.)

Ionizing radiation is but one of various agents that affect the stamina and well-being of population groups within species through induction of mutations in both the somatoplasm and the germplasm. A preliminary effort has been made to identify and examine central and pace-setting determinants of the life process, moving thereby toward a better understanding of the role and significance of radiation.

On the basis of accumulated information and deductions that follow logically, questions have been raised regarding (1) the part natural radiation may have had in shaping the character of life processes through time, possibly influencing both the course and rate of evolution and the average life-span of species; (2) the matter of whether radiation, though injurious to cells, may not under certain circumstances have a beneficial effect in complex multicellular organisms; (3) radiation as an agent acting to reduce the fitness reserve in organisms; and (4) the limits of exposure so far as individual and group survival are concerned. A formulation has been developed which aids in visualizing the "total health" process and how this is affected positively and negatively by various factors, including radiation. By means of the formulation some impression is gained of the stability of the life process, on the one hand, and, on the other, of its extreme vulnerability if an environmental factor such as radiation is altered significantly. [From the Author's abstract]

Biological Effects of Ionizing Radiations. Roberts Rugh.* J. Neuropathol. & Neurol. 17:2 (Jan.) 1958. (*Department of Radiology, College of Physicians and Surgeons, Columbia University, New York)

Several types of ionizing radiation can cause injury in living organisms—alpha-particles, beta-particles, neutrons, x-rays and gamma-rays. That the effect seen is not a general thermal one is best explained on the basis that a lethal dose of ionizing radiation would cause only about 0.002 degree C temperature rise in vertebrates. There are wide differences in radiosensitivity between species, individuals of one species, and cells of one individual. Even this, the radiosensitivity of a given cell or tissue, may be altered by age, metabolic rate, hydration, or the presence of certain protective agents. Positive effect on the intact organism, from acute death to long-delayed neoplasm depends in large measure on time-dose relationship. That there are about 10 theories of mechanism indicates the complexity of what is known and the existence of what is unknown.

Milk Contamination in the Windscale Incident. A. H. Wolff.* Public Health Rep. 74:42 (Jan.) 1959. (*Division of Radiological Health, Public Health Service, Washington 25, D. C.)

The Windscale incident of October, 1957, involved a reactor fire and resulting release of fission products to the atmosphere, of which radioiodine (I^{131}) was the most significant because of its volatility. Subsequent uptake by dairy cattle resulted in the condemnation of 250,000 gallons of milk over a 200 to 300 square mile area. Emergency permissible levels were low because of the large segment of the juvenile diet formed by milk, and the relatively higher radiosensitivity of the thyroid in infants and children.

Dermatology

William R. Buckley, M.D.

Gamma-Globulin Therapy in Chronic Staphylococcic Dermatoses. W. J. Morginson,* D. C. Wood, and L. Burgess. A.M.A. Arch. Dermat. 79:305 (March) 1959. (*Division of Dermatology, Department of Medicine, University of Utah College of Medicine, Salt Lake City)

Chronic staphylococcic infection associated with eczematoid dermatitis, seborrheic dermatitis, intertrigo, pyoderma, folliculitis, furunculosis, and acne vulgaris was studied in series of patients to determine whether the list showed a lowered antibacterial titer and/or a lowered gamma globulin level, and to determine patient response to treatment with gamma globulin. The majority of patients studied revealed that they had a marked hypogammaglobulinemia and a lowered serum antibacterial titer. This latter finding was further subdivided into a complement-depending factor (properdin) and a non-complement-depending factor or factors—both were found to be lower. Not all cases fitted this general pattern; hence a diagnostic generalization must not be made at this time.

Most patients with low gamma globulin levels were helped by treatment with gamma globulin intragluteally in 20 ml doses at three to four week intervals.

Some Practical Aspects of the Diagnosis and Management of Shoe Dermatitis. A. A. Fisher.* A.M.A. Arch. Dermat. 79:267 (March) 1959. (*Department of Dermatology and Syphilology of the New York University Postgraduate Medical School and the Skin and Cancer Unit of the New York University)

Fisher stresses that the diagnosis of dermatitis from shoes depends on the history, clinical findings, positive skin patch-test reactions to shoe materials, and, most importantly, the patients' ability to wear proper substitute shoes without a recurrence of dermatitis. Materials for patch-test screening of patients who present a shoe dermatitis are outlined. Names and addresses of shoe manufacturers and dealers where shoes without specific sensitizers may be obtained are listed. Certain factors which act nonspecifically, such as perspiration, friction, and orthopedic deformities, in the production or aggravation of shoe dermatitis are discussed.

The Treatment of Dermatomycoses with Orally

Abstracts

Administered Griseofulvin. H. Blank* and F. J. Roth. A.M.A. Arch. Dermat. 79:259 (March) 1959. (*Division of Dermatology, Department of Medicine, University of Miami School of Medicine)

This paper presents a preliminary report on the effectiveness of oral griseofulvin in the treatment of mycoses caused by various species.

Griseofulvin is an antibiotic that was isolated from Penicillium griseofulvium by Oxford, Raistrick, and Simonet, in 1932. It is colorless, neutral, and thermostable. Clinically, it has produced a rapid response in species of Microsporum, Trychophyton, and Epidermophyton. T. rubrum appears unusually sensitive. Clinical lesions produced by Candida albicans, Malassezia furfur, and Blastomyces dermatitidis have not responded to therapy. Griseofulvin is fungistatic rather than fungicidal. Optimal doses for therapy of all types of infection have not been worked out as yet, although a daily dose of 1.0 gm appears to be adequate. Duration of treatment may be expected to vary, and the possibility of relapse or recurrence is not known at this time.

Specific Metabolic Processes of Skin. A. L. Lorincz* and R. B. Stoughton. Physiol. Rev. 38:481 (July) 1958. (*Section of Dermatology, University of Chicago)

In this paper, the authors review certain metabolic processes which are specific to or are related to skin. The important process of keratinization is developed with the epithelial cell at the starting point and continued through to the formation of a keratin, a chemically inert fibrous protein. Numerous physical and chemical properties of the keratins are discussed, as well as their structure from the x-ray diffraction studies of Astbury and his colleagues. Studies on the surface skin lipids are reviewed. The contributions made by the keratinizing epidermal cell and the excretory products of sebaceous and apocrine glands are outlined.

Mucopolysacchardies of the cutaneous ground substance, cutaneous carbohydrate metabolism, and proteolytic enzymes are each discussed separately. The review includes what is known of the physiology and chemistry of the structures involved.

[NOTE: This is an excellent review article.]

Vascular Lesion of Hereditary Hemorrhagic Telangiectasia. R. M .Bird* and W. E. Jaques. New England J. Med. 260:597 (March) 1959. (*Department of Medicine, University of Oklahoma School of Medicine, Oklahoma City)

The authors present the clinical and pathologic findings on a 68-year-old white man with hereditary hemorrhagic telangiectasia (Rendu-Osler-Weber disease). Typical lesions were present on the face, in the mouth, and on the extremities at the time of hospital admission. At necropsy only the vascular lesions of the tongue and buccal mucosa persisted. The basic vascular lesions were confined to large and small veins, and all major organ systems were involved.

Because of the bizarre and widespread vascular abnormality, it seems a matter of chance as to which involved structure will produce symptoms. In addition, because of the diffuse nature of the process, operative removal of involved tissue, except for control of hemorrhage, does not seem possible.

In this patient, death followed a severe intratracheal hemorrhage.

[NOTE: This heredofamilial disease, long a dermatological entity, may have frequent systemic implications. It is important to discover this entity at the time of the preplacement examination.]

Mental Health

Graham C. Taylor, M.D.

Industrial Psychiatry. R. T. Collins. Am. J. Psychiat. Vol. 115, Jan., 1959.

The pertinent industrial psychiatric literature of the year is reviewed under the following headings: automation, alcoholism, pharmacological agents (discussing the effects and uses of tranquilizers on workers in industry). Also reviewed are foreign reports, films and books. The Aluminum Company of America and the General Electric Company had produced films to help executives and employees prevent emotionally disturbing situations. The Metropolitan Life Insurance Company, through its health and welfare division, has produced a very good film "Mr. Finley's Feelings." Twenty-eight references are given.

Memo on Communications. J. J. Keogh. Personnel Journal 27:292 (Jan.) 1959.

The author divides his topic up into one-way communications and two-way communications.

One-Way Communications

(*a*) *the memo*—this is the quickest and most direct communication, but one cannot be sure if it reaches its intended receiver.

(*b*) *bulletin boards*—in general can be a good means of communication if they are kept up to date and pertinent.

(*c*) *house communications*—these are on the way out, as they suggest paternalism, and there is a time lag between the actual news item and its distribution.

(*d*) *general meetings*—they consume a lot of employee time. They may fail when there is no response to the speaker during the question and answer period, or when an extrovert talks on at great length. However, if a subject is sufficiently important, the meeting well planned, and both the silence and the extrovert handled properly, the meeting can be a success.

Two-Way Communications

(*a*) *suggestion systems*—Keogh points out some of the inherent dangers in this system. Management

should be aware of the fact that this would be a means for airing gripes. A poorly run suggestion system is much worse than no suggestion system at all. If it is properly organized, it may be a good medium for the suggestion of ideas and communication.

(*b*) *grievance system*—this is, of course, present with unionized companies. There should be an adequate grievance system which will clarify problems and identify trouble spots in the organization.

(*c*) *staff conferences*—if well organized and administered can be very helpful.

(*d*) *the grapevine*—this occurs in any case, and it is most active where formal communication is at a minimum. With good sincere formal communication, the functions of the grapevine system decreases.

(*e*) *attitude surveys*—should be done occasionally for a specific need, perhaps by an outside consultant. The author says, "you ought to see yourself as your employees see you once in a while. It may be a very sobering experience."

[The medical department itself might analyze its communications with other divisions of the company, perhaps, under some of the headings outlined above.]

Management Discovers Psychiatry. A. A. McLean.* Think, p. 6, March, 1959. (*I.B.M., 590 Madison Ave., New York)

There are at least 8 corporations employing full-time psychiatrists within the United States, and there are some 200 companies using psychiatrists on a part-time basis. The author states: "In the business world, the psychiatrist's main job is stimulating mental health more than treating mental illness." The industrial psychiatrist is engaged in clinical activities, in mental health education for management, and in research. He also states that "the psychiatrist himself has to be familiar with both work locations and processes to see individual problems which they may present, and to meet informally members of all departments." It is suggested that certain factors in the organization can be emotionally toxic, in somewhat the same way as organic processes can be toxic, and call therefore for safeguards. Emotionally toxic factors or emotionally stressful situations may be present in all departments within industry. The function of the occupational psychiatrist is to attempt to identify and take appropriate measures with respect to these "toxic factors."

The Executive Interview: Pointers on the Art of Asking Questions. R. Burger. Management Review, p. 18, March, 1959.

This article is based on a chapter in a forthcoming book. It is aimed at helping the executive, but actually is of value to anyone engaged in the interviewing process. The author makes a reference to the work of Dr. Harry Stack Sullivan, "The Psychiatric Interview," warns about leading questions and dead-end questions, the disarming question and silence, or the implied question. The indirect question is mentioned as an example of the use of the nondirective or "mirroring approach." Finally, she concludes that "the appropriateness of your questions will be dictated by the purpose of the interview, but in all situations the basic code is good rapport—and attaining this goal requires patience, acceptance, and understanding."

The Novelists' Picture of Management and Managers. W. G. Scott. Personnel Administration, p. 9, Jan.-Feb., 1959.

This article points out that "the artist," in this case the novelist, "is frequently more perceptive of human problems than are the critical and scientific management writers. This sensitivity enables the novelist to relate the complicated picture of cultural and personality interactions which are at the core of managerial behavior." The author then discusses the hero-manager of the past and the hero-manager of the present. The latter is discussed under the following headings: the contemporary hero-manager profile, conformity, wives and home life, rebellion, the prop executives, the operators. The hero-manager of the future is then discussed. Among the novels referred to in this article are the following: "Sincerely Willis Wayde," by John P. Marquand; Cameron Hally's "Executive Suite"; Bernard Lester's "Weatherby Crisis"; and Ernest Pawel's "From the Dark Tower."

Further Light on the Executive Personality. L. Huttner, S. Levy, E. Rosen, and M. Stopol. Personnel, p. 42, March-April, 1959.

This article is a continuation of a study entitled "The Executive Personality," by E. Rosen, in *Personnel*, Jan.-Feb. 1959. p. 8.

It is concerned with the characteristics of executives in various fields and with the effect of factors such as age and company size. Four types of executives are considered—engineering and research and development executives, sales executives, administrative and accounting executives, and production executives. It is stated that engineering executives are very good at abstract reasoning but are not so good with verbal material and are the least dominant of the four groups of executives studied. They are also less well adjusted than the other four groups. The sales executives are less accurate than the others; they are highly dominant and extroverted; they are more optimistic and self-assured and somewhat self-centered. The administrative executives are orientated toward specific considerations rather than abstractions. They are good in their theoretical grasp of business, low in communication ability, and also low in optimism.

The production executives are very high in abstract reasoning, are orientated toward the concrete, and tend to be optimistic, but they have mood swings as well.

Abstracts

Concerning the effects of age, it is stated that "there is some diminution of intellectual powers with age, especially as regards abstract reasoning ability, the ability to organize abstractions, and reading speed." The factor of company size is considered, and the authors indicate that the executives of larger companies have better knowledge of their particular field than those of smaller companies, and, what is more important, that "the executives of larger companies generally have greater mental ability than those of the smaller companies."

Reparative Surgery

Robert J. Trettin, M.D.

Studies in Metabolism of Trauma: III. Postoperative Sodium Retention. H. E. Jorgensen* and J. U. Schlegel. Surg. Gynec. & Obst. 108:339 (March) 1959. (*University of Rochester, School of Medicine & Dentistry, Rochester, New York)

It has long been recognized that one of the metabolic changes in man following trauma concerns the handling of sodium. This study was undertaken to determine if sodium retention is prevented by the establishment of an osmotic diuresis with 4% urea.

Two groups of patients were studied: Group 1 (control group), 18 patients who in the postoperative period were given 2,000 to 3,000 cc of 5% dextrose in water; Group 2 (urea group), 29 patients who in part of the postoperative period were given about 3,000 cc of 5% dextrose in water with 4% urea and 80 mEq of sodium chloride. Balance studies were carried out for the day of operation and three postoperative days.

While dilution of serum sodium took place in the patients in Group 1, homeostasis in regard to water and sodium was maintained in the patients in Group 2. There appeared to be no exchange of extracellular sodium ions with intracellular potassium ions in the patients who were treated with urea.

Sodium excretion was slightly higher in the patients in the urea group, and no sodium retention was present except in three patients, of whom two had decreased renal function and the third was on cortisone treatment.

A Study of the Circulation in Normal Tendon and Healing Grafts. Erle E. Peacock Jr.* Ann. Surg. 149:415 (March) 1959. (*Department of Surgery, University of North Carolina School of Medicine, Chapel Hill)

Tendon surgery designed to preserve physiology must consider blood supply. Failure to achieve an adequate functional result may be due partly to failure of the surgeon to think in terms other than restoration of a static cable.

The author reports on experiments, utilizing adult mongrel dogs, designed to determine the importance of central mesenteric vessels or their counterpart in postoperative adhesions. It is concluded that the intrinsic vessels in long tendons are not capable of nourishing the central third by anastomosis with vessels entering from either the muscular origin or the periosteal insertion. Circulation to the central third of long tendons is by intermediate segmental vessels entering through disorganized paratenon or a definite volar mesentery. In free grafts this portion of the circulation is restored through postoperative adhesions.

Permanent disruption of the central blood vessels to normal tendon or mechanical prevention of postoperative adhesions around free grafts caused cellular death and disintegration of collagen bundles. On this basis further search for suitable substances to wrap around flexor tendon grafts to prevent fibrous adhesions does not appear likely to be rewarding.

Surgical Treatment of Injuries to Ligaments of the Knee. D. H. O'Donoghue.* J.A.M.A. 169:1423 (March 28) 1959. (*Lee at 10th Street, Oklahoma City 3)

The author reemphasizes the necessity for an extremely accurate diagnosis of an injury to the knee if one is to be prepared to carry out the ideal treatment. The severest forms of knee injuries often do not heal properly without surgical intervention. This is true whenever any major ligament is completely cut across or avulsed from its attachment, and particularly when the torn ends of one structure come to lie in positions that hinder the union of other structures.

Symptoms of pain, instability, abnormal mobility, hemarthrosis, and circumarticular effusions which testify to severe injury demand precise diagnosis, under anesthesia if necessary, and prompt surgical treatment if indicated.

In the author's series of 150 surgical cases, a regimen of early examination, prompt decision, complete repair of all torn ligaments, and conscientious rehabilitation has given increasingly gratifying results.

Effect of Antibacterial Agents on Clean Wounds. C. K. Sergeant,* J. L. Ponka, and B. E. Brush. A.M.A. Arch. Surg. 78:480 (March) 1959. (*Division of General Surgery, Henry Ford Hospital, Detroit)

Substances for local application to wounds continue to be offered and frequently recommended as adjuncts to epithelation, despite the known facts that chemicals applied to wounds generally retard their healing. As each new antimicrobial agent is discovered, an ointment is invariably promoted for application to wound surfaces. The agents must be appraised, as they appear, so that no harm will result in their use.

Young male guinea pigs were employed in this experimental study, testing seven antibacterial ointments. Elliptical portions of skin were excised on both sides of the midline of the abdomen, one

to serve as the experimental wound and the other as the control wound.

It was found that the antibacterial agents tetracycline (Achromycin), chlortetracycline (Aureomycin), bacitracin, chloramphenicol (Chloromycetin), neomycin, polymyxin B, and oxytetracycline (Terramycin) generally do not retard or accelerate the rate of wound healing, with the exception of chlortetracycline, which was found to retard routinely the time for healing from two to six days.

Prednisolone (Meticortelone) in Treatment of Epicondylitis. T. A. Lamphier,* J. Pepi, J. Covino, J. Ostroger, C. E. Rosenthal, and C. Brusch. A.M.A. Arch. Surg. 78:492 (March) 1959. (*30 The Fenway, Boston 15)

Epicondylitis of the humerus is commonplace and yet often misdiagnosed and subsequently mistreated. The causative factor of this condition is unknown.

Tennis elbow actually can be one of two types of pathologic change. The commoner type involves the common extensor tendon of the forearm at its origin on the lateral epicondyle of the humerus. The more infrequent lesion involves structures with a synovial lining, radiohumeral bursitis, or radiohumeral synovitis.

The type of pain pathognomonic of this condition is produced over the site of the lesion when the elbow is extended and when the wrist is dorsiflexed against applied resistance.

Local injections of chloroprocaine (Nesacaine) and prednisolone (meticortelone) for epicondylitis failed in only 21 patients in this total series of 391 patients.

Nerve Injuries in the Upper Extremity. R. D. Larsen* and J. L. Posch. A.M.A. Arch. Surg. 77:469 (Oct.) 1958. (*1405 Kales Building, Detroit 26)

The authors review their experience in 325 cases of nerve injuries in the upper extremity treated between 1950 and 1957. These injuries are among the more important means of partially or completely crippling the extremity.

In addition to testing the integrity of the sensory and motor nerves of the extremity, one should look for injured tendons and for fractures. Accurate anatomical knowledge is necessary in order properly to diagnose and treat a nerve injury in the upper extremity. Immediate or primary repair of the nerve is favored whenever possible. In cases of contaminated, crushed, or torn wounds, or when adequate operating facilities are not available, secondary repair is to be preferred. Sensory return, after nerve repair, is uniformly good. Except in children, there is almost always some sensory deficit demonstrable by careful testing. Return of motor function following nerve suture is almost satisfactory in the radial nerve and is satisfactory in one-half to two-thirds of the cases in the median nerve at the wrist. Motor return is uniformly unsatisfactory in ulnar nerve lacerations, regardless of where they are encountered.

Abstracts

Tendon transfer operations are available to restore function to a permanently paralyzed portion of the extremity. These procedures are briefly described.

Internal Medicine

Leo Wade, M.D.

Unrecognized Myocardial Infarction. W. J. Johnson,* R. W. P. Achor, H. B. Burchell, and J. E. Edwards. A.M.A. Arch. Int. Med. 103:253 (Feb.) 1959. (*Mayo Clinic, Rochester, Minn.)

The authors selected 143 autopsied cases of either acute or healed myocardial infarction for study. In these cases, 113 patients had healed infarcts. In 56 cases (50%) there was no evidence that the diagnosis had been made or even suspected prior to autopsy. Failure to establish the diagnosis during life seemed to be related to the following factors:

1. The quality of the medical history: The more carefully the history is recorded, the less frequently is the diagnosis missed.
2. The location of the infarct: In general, subendocardial lesions were missed more commonly than transmural infarcts.
3. The presence of other disease which precludes adequate history-taking or diverts attention from the chest pain.
4. Failure to take repeated cardiograms in the face of an early normal cardiogram.
5. An elevated pain threshold or a clouding of consciousness which may accompany infarction.

Pulmonary Tuberculosis Associated with Carcinoma of the Lung. A. J. Christoforidis* and R. H. Browning. A.M.A. Arch. Int. Med. 103:231 (Feb.) 1959. (*Ohio Tuberculosis Hospital of the Department of Health, The Ohio State University Campus, Columbus)

Active tuberculosis of the lung is becoming increasingly a disease of older men. Carcinoma of the lung is also commoner in this group and is apparently increasing in frequency. The urgent need to recognize carcinoma at the earliest possible time makes it mandatory that the physician be alert to the possibility that a tuberculous lesion is masking a carcinoma.

On the basis of careful study of 10 cases the authors emphasize the value of the following considerations: (1) Unilateral hilar lymph node enlargement is characteristic of carcinoma and not tuberculosis; (2) the appearance of an infiltration near to or remote from the tuberculous lesion should arouse suspicion, especially in those instances where the tuberculous lesions appear otherwise to be healing; (3) careful comparison of current x-ray films with previous films with regard to hilar node enlargement, changes in extent of the infiltration, the presence and appearance of calcium deposition, the presence of meta-

static bone lesions, the location of new lesions, etc.; (4) clinical features, e.g., wheezes of partial bronchial occlusion, hemoptysis, weight-loss, anemia, etc., especially in the face of healing of a tuberculous lesion.

Diabetes in Industry. Leo Wade.* Diabetes 8:143 (March-April) 1959. (*Esso Standard Oil Company, New York)

About 1.3% of some 20,000 long-term male employees developed diabetes during the course of employment. Two-thirds of these cases occurred in men between 45 and 60 years of age. Approximately 80% of the employees were devoid of signs or symptoms of diabetes at the time of diagnosis. Insulin was required for control in 74% of the cases. These men engaged in a wide variety of jobs, both sedentary and active. In only 3.2% of instances were restrictions necessitated by the appearance of diabetes. In eight instances the possibility of insulin reaction precluded driving company vehicles or operating heavy machinery. In two instances shift work was not compatible with adequate control of the diabetes.

These observations demonstrate clearly the compatibility of diabetes with productive employment. It is suggested, however, that physicians responsible for the care of young diabetics might well counsel them on the choice of careers, keeping in mind the above experience.

Brucellosis: I. Laboratory-Acquired Acute Infection. R. W. Trever, L. E. Cluff,* R. N. Peeler, and I. L. Bennett, Jr. A.M.A. Arch. Int. Med. 103:381 (March) 1959. (*The Johns Hopkins Hospital, Baltimore, Md.)

Sixty cases of acute brucellosis occurred among laboratory personnel engaged in bacteriologic studies over a 12-year period. While some infections followed documented laboratory accidents, all were recognized very early by virtue of regular clinical examinations and serological studies on all personnel exposed to this potential occupational hazard. Incubation periods of four to eight weeks were usual. Only fever and a rise in agglutinin titer are noted at the onset of the disease. Neither tetracycline nor streptomycin or combinations thereof affected the clinical course of the disease.

"Chronic brucellosis" remained an ill-defined entity, both clinically and serologically. Nonetheless, 24 of the 60 cases were so labeled.

A Primer on Radiation Hazards for Physicians. R. E. Peterson,* J. G. Baron, B. M. Kent, and T. C. Evans. A.M.A. Arch. Int. Med. 103:308 (Feb.) 1959. (*Department of Internal Medicine, State University of Iowa, University Hospital, Iowa City)

After a definition of radiation units and equivalents, the authors point out that possible sources of radiation are (1) occupational, (2) nuclear fallout, (3) natural radiation background, (4) medical use of diagnostic x-rays. The lack of a suitable antidote, the insidious nature of radiation damage, and the dire (often fatal) consequences of overexposure point up the need for a carefully established maximum permissible exposure level. These are (1) for occupational hazards, 5 r, or 350,000 gm-r per year; (2) for the population as a whole, 0.5 r per year, which is about three times the average background irradiation dose, or 10% of the limit on occupational exposure. The possibility of future lowering of these permissible exposure levels must be kept in mind.

The consequences of excessive exposure for the individual are (1) neoplastic complications; (2) aplastic anemia; (3) radiation cataracts; (4) congenital malformation of offspring; (5) shortening of the life span; and (6) death.

Protection involves (1) education of those who receive and those who provide exposure, (2) the use of appropriate techniques, (3) a radiation diary for individuals, (4) proper legislative controls, and (5) revision of medical use (conservative use in diagnostic procedures and follow-up examinations, avoidance of use as therapeutic measure in numerous benign and self-limiting disease states).

Experimental Toxicology

Robert E. Eckardt, Ph.D., M.D.

The Biochemical Lesion in Blindness Due to Methanol Poisoning. J. R. Cooper* and V. T. Marchesi. Fed. Proc. 18:378 (March) 1959. (*Yale University School of Medicine, New Haven)

The ocular toxicity of methanol is mediated through formaldehyde, and the retina is the primary target. With use of bovine retinal homogenates, it was found that hexokinase was the most sensitive glycolytic enzyme to minimal concentrations of formaldehyde. This inhibition was competitive and could be overcome by excess glucose addition. When one eye of a rabbit was injected with formaldehyde, marked retinal edema and blurred pigment streaks were seen. The control eye, injected with water, remained normal. Similar results occurred with N-acetylglucosamine, a competitive inhibitor of hexokinase. Enzymatic assays of the retinas disclosed normal glycolytic activity. When glucose was injected into the eye with formaldehyde, no damage resulted. In methanol poisoning, a situation analogous to temporary anoxia in the retina is believed to exist, in which hexokinase is inhibited long enough to cause degeneration which may result in varying degrees of injury with blindness.

Potentiation of Toxicity of Malathion by Triorthotolyl Phosphate. S. D. Murphy,* R. L. Anderson, and K. P. DuBois. Proc. Soc. Exper. Biol. & Med. 100:483 (March) 1959. (*Univ. of Chicago)

Quantities of triorthotolyl phosphate (TOTP) which produce no apparent deleterious effects increase the toxicity of Malathion to male rats to an extent greater even than that observed with

any pair of organic phosphorus insecticides studied thus far. The greatest effect was seen when Malathion was given 24 hours after dermal or intraperitoneal administration of 110 mg/kg of TOTP, the LD_{50} being reduced from the normal 1,100 mg/kg to 12.5 and 8.2 mg/kg, respectively. The increased susceptibility persisted for as long as 14 days after treatment with TOTP. When TOTP was given 24 hours after Malathion, no potentiation was observed. It is suggested that any agent capable of inhibiting the hydrolytic detoxification of Malathion would potentiate its toxicity, thus extending the problem, beyond insecticidal agents, to any material which commonly gains entrance into the body.

An Evaluation of the Methods of Assessment of the Toxicity of Chemical Compounds. E. Browning. Tr. A. Indust. M. Officers 8:138 (Jan.) 1959.

In assessing the toxicity of materials in the working environment, the following should be considered by the industrial physician: the chemical nature of the material, particularly in the case of trade-named materials; published reports of toxicity and lists of MAC's; animal experiments on the material in question; analyses of blood and urine for the compound or its metabolites; and clinical examinations of workers, with emphasis on blood examinations. The physician's own "field investigations" on his people and their working environment are considered the most important, but adequate evaluation of toxicity requires some consideration of all of the above.

Tissue Reactions from Amorphous Fine Silica and Quartz of Different Sizes. Yoshitaka Furuya. Koshu Eiseiin Kenkyu Hokoku 7:29, 1958 (Chem. Abst. 53:584e [Jan. 10] 1959).

Fine amorphous silica powder did not cause a fibrotic change in liver, but a slight giant cell formation was detected. Quartz powder (1.5-4.5 μ diameter) was strongly fibrogenic, and the grade of pedicular sclerosis was inversely proportional to powder size. Quartz powder caused thickening of the alveolar septum of the lung and macrophagocytosis in the spleen, but no fibrogenic feature was observed in either tissue.

Observations on the Effects of Condensates from Cigarette Smoke on Human Foetal Lung in Vitro. I. Lasnitzki.* Brit. J. Cancer 12:547 (Dec.) 1958. (*Strangeways Research Laboratory, Cambridge, England)

Four fractions of smoke condensate from a smoking machine or Denicotea filters, added to the medium of growing human fetal lung, promoted the growth of bronchiolar epithelium after 10 to 19 days. All produced a generalized increase in new bronchioli, followed by hyperplasia of the epithelial lining in individual bronchioli. The latter stage was characterized by three histological types depending on the fraction: Basal-cell hyperplasia was seen after the whole neutral fraction from Denicotea tar and after the hydrocarbon fraction from the neutral Denicotea tar; pleomorphism of cells with loss of secretory epithelium was present after the neutral smoking machine tar, and squamous metaplasia was present after the hydrocarbon-free fraction from Denicotea tar. These changes resemble those obtained after treatment with 20-methylcholanthrene and 3,4-benzpyrene in organ cultures of the mouse prostate and human fetal lung, except that the latter rarely caused squamous metaplasia. The effects thus cannot be attributed to 3,4-benzpyrene alone.

Gastrointestinal Absorption of Mg^{28} in Rabbits. J. K. Aikawa.* Proc. Soc. Exper. Biol. & Med. 100: 293 (Feb.) 1959. (*University of Colorado School of Medicine, Denver)

Three groups of normal rabbits were starved for 17 to 48 hours prior to feeding of a dilute solution of $Mg^{28}SO_4$. Mean urinary excretion of radioactivity in 48 hours ranged between 10-12.5% [of the ingested quantity]. The high concentration of radioactivity detected in the midabdomen by external survey was traced to fecal content of caecum and colon. Fecal excretion was increased by resumption of feeding after exhibition of Mg^{28}, and concentration of radioactivity over the midabdomen decreased. These results suggest that poor gastrointestinal absorption of magnesium accounts for its low renal excretion. Absorption does not appear to occur from the large intestine.

[From the author's abstract]

Oximes of αw-Diquaternaryalkane Salts as Antidotes to Organophosphate Anticholinesterases. W. K. Berry,* D. R. Davies, and A. L. Green. Biochem. J. 71:15p-16p February 1959. (*Chemical Defense Experimental Establishment, Wilts, England)

Oximes will restore phosphorylated cholinesterase activity and can counteract the lethal effect of organophosphate anticholinesterases. The authors have synthesized 30 new compounds with the general structure:

$$HO\text{-}N = CH\text{-}C_5H_4N^+ [CH_2]_n R^+, 2\ Br^-$$

Their rate of cholinesterase reactivation correlates well with their protective effect when given subcutaneously to mice at 5 mg/kg with 17.4 mg/kg atropine sulfate 10 minutes before subcutaneous dosing with tetraethyl pyrophosphate (TEPP). The two best compounds raised the TEPP LD_{50} about 100 times, and they reactivated the enzyme about 10 times faster than PAM.

Measurement of Pulmonary Resistance and Compliance with Concurrent Tissue Radioactive Sulfur Distributions in Dogs Inhaling a Labeled Air Pollutant—Sulfur Dioxide. O. J. Balchum,* J. Dybicki, and G. R. Meneely. Fed. Proc. 18:6(20) (March) 1959. (*Vanderbilt University School of Medicine, Nashville, Tenn.)

Dogs inhaled S^{35}-labeled SO_2 gas in air in concentrations from 1 to 150 ppm via tracheostomy for 20 to 40 minutes, with measurement of pulmonary resistances and compliances before, dur-

Abstracts

ing, and for 30 minutes after exposure. No changes in pulmonary compliance were observed. Pulmonary resistance increased by 50% to 125% over control levels within 10 seconds after onset of exposure. S^{35} was present in all tissues examined, and the per cent uptake of administered dose was as follows: trachea 42%, lungs 2.6%, hilar lymph nodes 1.7%, brain 2.8%, eye 0.3%, liver 5.7%, spleen 0.7%, and kidneys 6%. Serial peripheral arterial and venous blood level determinations showed a gradual rise after onset and a slow fall after exposure ended. S^{35} reached all tissues readily and penetrated the brain barrier. Since effects show a rapid onset and abrupt cessation, the mechanism of SO_2 action must be local, either directly or by nervous reflex action.

Medical Care Administration

Asa Barnes, M.D.

The Legal Scope of Industrial Nursing Practice. Committee on Industrial Nursing of the Council on Industrial Health.* J.A.M.A. 169:140 (March 7) 1959. (*American Medical Association)

The purpose of the report is to discuss the legal scope of the practice of industrial nursing and the functions which a professional industrial nurse may legally perform. Fundamentally, the scope of nursing practice is determined by medical custom. None of the statutes relating to nursing practice, attempt to set forth the specific functions of nursing. The courts have been guided in identifying nursing functions by customs and practices of the medical profession. Courts have held that professional nurses have a legal duty to interpret evidence presented by the patient possibly indicating the need for medical attention, and to proceed to do what is required for the patient. Under the direction of physicians, nurses are performing numerous procedures which formerly were performed exclusively by physicians. The limitations on procedures which nurses may properly perform are governed by (a) the relationship between the medical and nursing professions in the community (b) the scope of training offered in nursing training schools and (c) training, experience, and proficiency of the individual nurse.

Financing Medical Care for the Aged: 1. The Problem—The Role of the Federal Government. Franz Goldmann.* Am. J. Pub. Health 49:161 (Feb.) 1959. (*Council of Jewish Federations and Welfare Funds, New York)

This paper is one in a symposium presented before the medical care section of the American Public Health Association in St. Louis, October, 1958. The author explores the problem of the aged, pointing out the growth of this group of citizens, sex distribution, the fact that two-thirds of this group have very low incomes.

The principal sources of income are earnings from employment for less than 1 out of 3, OASI for nearly 6 out of 10, and public assistance for approximately 1 out of 7. The financial resources available to all but a small number of the senior citizens are barely sufficient to make ends meet and are grossly inadequate to meet any but minor expenses in case of illness. The health needs of senior citizens are greater than those of younger persons because of the high frequency of physical and mental illness, longer duration of illness, and large proportion of cases of partial permanent disability and invalidism.

The author points out that voluntary health insurance has been helpful to those able to acquire and continue membership, at present less than 40% of all senior citizens. These people need home care by physicians, nurses, and other personnel; medical and nursing care in institutions for long-term care; drugs, and appliances—benefits seldom, if ever, included in contracts. He states that the idea of financing health services for senior citizens through the mechanism of OASI has attracted renewed attention. Since 9 out of 10 gainfully employed persons are already covered, most of the senior citizens could easily acquire paid-up insurance for health service as well as income maintenance.

The article stresses the fact that no matter how prepayment for medical care is organized, the use made of the funds is of paramount importance if it is to do the job.

The Physician and Labor Health Plans. American Labor Health Association, 16 E. 16th St., New York 3.

This is the third of a series of pamphlets issued by the American Labor Health Association and is designed to present the reasons for labor's concern and for its participation in the health field.

It points out that the economics of medicine have been greatly affected in recent years by changes in disease patterns, technical advances in medical care, and the wide application of the health insurance principle. From the patient's viewpoint, medical care has become increasingly efficient as well as expensive and complex. Today's worker is increasingly aware of his need for a comprehensive and coordinated health service and relies on prepayment arrangements to take care of the high costs. The labor movement finds itself concerned with the problem of arranging for adequate health services; its interest is focused on cost, quality, and scope of service rendered.

The authors point out that both labor and medicine are learning that cooperation is needed if better health service is to be the goal. Labor needs the help of enlightened members of the medical profession, their advice, their leadership, and their services. It is labor's belief that the objectives can be endorsed by all physicians concerned with the improvement of the public health. Some of those objectives are (1) a program organized on a nonprofit basis, (2) benefits to be in the form

of direct medical service rather than cash indemnity, (3) family members to be included, (4) health services to be comprehensive, (5) and the quality of medical care to be promoted by the plan but under the standards and supervision of a qualified professional group.

The Selective Placement of Cardiacs in Industry: An Analysis of Experience at a Large Refinery. Neill K. Weaver.* Postgrad. Med. 24:372 (Oct.) 1958. (*Esso Standard Oil Company, Baton Rouge)

For the past five years there has been a formal program for the placement of handicapped employees in operation at the Esso Baton Rouge Refinery. An understanding refinery management and cooperation on the part of the employees and their union officials has contributed greatly to the success of the program.

This paper points out that the program utilizes the matching of the workers' capacities with the physical demand of the job to achieve proper placement. The refinery medical department is accepted as a cardiac classification center, and the private physicians of the area refer their employee patients to it for evaluation of their ability to work. There is a careful system of follow-up both on the job and in the medical department.

Patients with cardiac disease were placed in all types of refinery jobs from executives to laborer. It was found that approximately a third of the employees with heart disease were able to continue in their previous assignment with little or any change and more than half were able to do the same job with some alterations of its required activities. The amount of sickness absenteeism attributable to heart disease was roughly equal to that of the average refinery worker for all medical cause. The author concludes that employees with partially disabling heart disease may continue to work effectively with proper placement.

Physicians' Private Offices at Hospitals. C. Rufus Roren.* Am. J. Pub. Health 48:874 (July) 1958. (*Hospital Council of Philadelphia)

There is a current evolution in medical practice that is bringing the physicians into closer relations to the hospitals. Many individual physicians are renting office facilities in hospitals for diagnosis and treatment of private patients. Several hundred nonprofit community hospitals are providing office facilities for doctors on hospital property. These facilities have been provided at the request of physicians who wish to conserve time in the care of patients and to avoid personal investment that would be necessary for equivalent services in private offices. This paper describes the general administration and financial arrangements of typical programs and attempts to indicate their advantages and limitations for doctors, patients, hospitals, and the public.

Doctors' offices at hospitals are most popular with specialists who hospitalize a relatively high proportion of their patients. They are less attractive to such specialists as pediatricians, psychiatrists, and dermatologists. According to the author, doctors with offices at the hospital are of the opinion that this arrangement has permitted them to practice better medicine with the same expenditure of time and energy and to provide equivalent medical service with less time and inconvenience.

The development of doctors' offices at hospitals must ultimately be appraised in terms of value to the general public, the hospitals, the patient, and the medical public.

Industrial Hygiene

Edward C. Riley, M.D.

Safe Use and Safe Handling of Organic Isocyanates. S. C. Straver.* (A.M.A. Arch. Indust. Health 19:351 (March) 1959. (*E. I. du Pont deNemours, Wilmington, Del.)

The author acknowledges the respiratory and skin hazards of organic isocyanates and outlines a rather rigorous program for prevention of injury during use of these materials. The program starts with plant and laboratory design, where fumes exhaust hoods are recommended for "unloading stations, prepolymer preparation kettle, mixing equipment, mold filling station, and waste disposal point. The hood should be so constructed that the minimum linear air velocity at the face opening should be at least 40 ft./min. when in the normal working position."

The need for decontamination facilities in case of accidental spills of isocyanate is indicated "These should include adequate floor drainage, hoses, mops, and buckets. An adequate supply of decontaminant consisting of aqueous 5 percent ammonia containing 10 percent isopropyl alcohol should be maintained. An oil absorbent, such as 'Oil Dri' should be provided since it is helpful in drying up spills. The poisoned absorbent, however, after use must be removed quickly to a ventilated location or 'killed' in aqueous ammonia.

"Safety showers should be provided in work areas. If major spills occur, air-supplied masks of the Acme full-face type or MSA Chemox Oxygen breathing apparatus should be used."

Suggested protective equipment includes side-shielded safety glasses, rubber aprons, rubber gloves, or other impervious gloves.

Additional safety procedures include a daily analysis of isocyanate content of the atmosphere in addition to decontamination of all spills as indicated above.

"Where severe exposure to isocyanate vapors can be encountered such as entering storage tanks or processing equipment for cleaning or repairing . . . the operator should be protected with a completely rubberized suit equipped with a fresh air mask." Paper or cardboard mold liners and wiping cloths should be placed in a trash con-

tainer, kept in a well ventilated space. A daily disposal procedure should be inaugurated.

"A summary of emergency measures for exposure to isocyanates is included."

As a guide to the sensitivity to the human for detecting vapors of isocyanates a series of tests was run on 24 persons, 50% of the groups reported that the least detectable odor was apparent at 0.4 ppm. "Irritation of the nose and throat occurred at about 0.5 ppm.; an appreciable odor was recognized at 0.8 ppm." It should be noted that in all cases these concentrations are in excess of the suggested MAC levels.

Microdetermination of Toluenediisocyanates in Atmosphere. K. Marcali.* A.M.A. Arch. Indust. Health 19:354 (March) 1959. (*Jackson Laboratory, E. I. du Pont de Nemours, Wilmington, Del.)

The author points out the "importance of a rapid method of control for toxic concentrations of toluenediisocyanates in the atmosphere to safeguard the health of industrial operating personnel and the general public," since the warning properties are inadequate to provide protection.

He reviews the chemical basis for the portable analytical kit provided through the Mine Safety Appliances Company and points out the possibility of reaction of toluenediisocyanate with limited quantities of moisture to produce a hydrolysis product, 3,3′ diisocyanato = 4,4′ = dimethylcabanilide. An analytical method is also suggested for detecting and measuring the presence of this compound in the presence of toluenediisocyanate.

A Portable Continuous Analyzer for Gaseous Fluorides in Industrial Environments. O. H. Howard* and C. W. Weber. A.M.A. Arch. Indust. Health 19:355 (March) 1959. (*Union Carbide Nuclear Company, Oak Ridge, Tenn.)

"An inexpensive portable fluoride analyzer has been developed for a continuous monitoring of environmental atmospheres. The analyzer responds to all substances which form fluoride ions in aqueous solution and is specific for fluoride in the presence of common air contaminants, including chloride below 100 μg/liter. The range of the instrument is 0.1 mg. to 10 mg. of fluoride per liter of air with a higher upper limit available through proper selection of air and solution flows. . . . The instrument, which could be used with an alarm device, is capable of continuous operation for indefinite periods with the attention limited to replenishment of the scrubbing solution every 30 hours and renewal of the recorder chart."

Hygiene of Welding in U. S. Naval Shipyards. Ernani D. Storlazzi.* A.M.A. Arch. Indust. Health 19:307 (March) 1959. (*Industrial Hygiene Division, Boston Naval Shipyard)

Welding has become big business in naval shipyards. The author states that 6,000 welders work in areas where another 60,000 persons are potentially exposed to toxic fumes from welding and burning. The study includes "arc welding with the use of a shield of coating or inert gas; gas welding with a use of oxyacetylene; resistance welding, and brazing." In addition, the hazards from welding and burning on painted and coated materials are discussed. A study confirmed the observation of others that inert-gas-shielded arcs (particularly argon) radiate much more ultraviolet than other types of arc welding. Special eye protection has been required for welders and others working in the vicinity of inert-gas-shielded arc welding, and special ventilation deevloped to control the hazardous fumes without removing the gas shield. Burning or cutting of steel produces less gas but more fume or metal oxide.

Lead burning, a process in which lead sheets or plates are joined by fusing the butted edges with a small torch, utilizes temperatures just above melting. No hazardous air concentrations or evidence of increased absorption on analysis of the blood and urine of the lead burner were found.

The following conclusions seem justified.

1. There is a lead hazard from welding or burning lead-painted metal in a confined space.
2. There is a fume hazard from welding or burning any coated metal in a confined space.
3. There is no hazard from chromium fumes from zinc chromate-coated plates.
4. Overexposure to metal oxides from welding or burning on exterior surfaces is unlikely.
5. Local exhaust can be effective in removing welding fumes.

Special mention is made of vinyl coatings, which gave rise to decomposition products, including HCl, which were objectionable and hazardous.

"The chest x-rays of all welders, burners, and shipfitters taken at the Boston Naval Shipyard during 1957 were reviewed to evaluate the respiratory hazard." In all, 1,083 men with employment of 6 to 41 years, with an average of 18 years, were studied. No specific occupational effects were observed.

The Use of Carbon Tetrachloride as a Fire Extinguishing Agent. Occupational Health Newsletter, 8: p. 1, Jan., 1959. (University of Washington, Seattle)

The hazards of carbon tetrachloride and other vaporizing liquid extinguishing agents are discussed in this issue of the newsletter, and reference is made to the National Fire Protection Association Bulletin No. 182-M, of May, 1958, expressing the properties of some of these materials and the nature of the hazard. Although most of these chemicals have been known for many years and many used in fire extinguishers, it is important that people using such toxic chemicals recognize the hazards of both the vapors and the breakdown products which may result under conditions such as are frequently found when these materials are used to fight fires in confined spaces. It is reassuring to note the emphasis on the misuse of these solvent fluids from fire extinguishers for cleaning fabrics, metals, and motors.

About the Authors

CAREY P. MCCORD, M.D., is author of the article, "Scurvy as an Occupational Disease," which appears on page 315 of this issue. He has been known for some 10 years to most industrial practitioners as the editor of *Industrial Medicine and Surgery*. To a much wider circle he is known as the author of a stirring autobiography, "A Blind Hog's Acorns," and a second book, "Odors — Physiology and Control." In a somewhat lesser circle he was and is known as the author and colorful presenter of numerous advances in the art and science of industrial medicine, at our meetings and in our journals. As the knowing circle shrinks, there are those who witnessed his efforts to help develop professional associations that would reflect the activities of occupational disease control as something distinct from surgical repair in industrial practice, first the American Industrial Hygiene Association and later the American Academy of Occupational Health. There are still fewer who were aware that neither of these developments suited him entirely, and that in either a fit of despair or one final surge of hope, he stimulated the formation of the Ramazzini Society. His intimates know him as a restless scholar and bibliophile, a raconteur of fabulous memory and great versatility, a gourmet with a matching capacity to prepare dishes of his own, and an aggressive fisherman in either sea or stream. He is welcomed in this issue as a historian of note with a fresh viewpoint and much new information on an old subject.

ENRICO C. VIGLIANI, M.D., is Professor of Industrial Medicine at the University of Milan and Director of famed Clinica del Lavoro "Luigi Devoto" and the University of Milan's Institute of Occupational Health, whose counterpart does not exist in this country. It houses an active outpatient department and in-hospital service for patients referred from the industrial district whose center is Milan, and is a consultation center for occupational disability problems originating elsewhere in Italy. It also houses industrial hygiene laboratories for environmental studies and research facilities for the study of occupational diseases. From this center have come a succession of publications that have presented with increasing detail the evidence to support the theory that the essential pathologic process of silicosis is an immunologic response. The latest in this series is Dr. Vigliani's article with his associate, Dr. B. Pernis, "An Immunologic Approach to Silicosis," presented in this issue. Professor Vigliani's earlier publications have dealt with the occupational poisonings caused by lead, mercury, and carbon bisulfide; asbestosis; and the health problems of textile workers.

Other appointments now held by Professor Vigliani include those of High Consultant of the National Institute for Insurance against Accidents and Occupational Diseases (I.N.A.I.L.), and of the National Institute for the Prevention of Accidents (E.N.P.I.); and Member of the Medical Research Committee of the European Community for Steel and Coal.

JOHN G. HIPPS, M.D., is physician to the Monongahela Connecting Railroad Company, an interplant switching railroad owned by the Jones and Laughlin Steel Corporation. He is a graduate of the University of Pennsylvania School of Medicine, in the class of 1953. He served an internship at the Delaware Hospital, Wilmington, where he became interested in occupational medicine as a career. He was awarded an Atomic Energy Commission Fellowship in Industrial Medicine, under which arrangement he pursued the three-year graduate program at the University of Pittsburgh and Bettis Atomic Power Division of Westinghouse Electric Corporation. During the in-plant year of this program he carried on a research project that dealt with the meas-

An Exclusive Privilege of I.M.A. Membership

. . . 2 Officially Sponsored Group Insurance Programs

PROGRAM No. 1—Accident-Sickness Disability Income Benefits. For Disabling Sickness and Hospital Benefits. You receive up to:

$10,300.00
(Tax Free Income)

Additional benefits for disabling accidents and hospital benefits up to:

$34,700.00
(Tax Free Income)

PROGRAM No. 2—World-Wide Accidental Death, Loss of Limbs & Eyesight Protection up to

$200,000.00

(Member's Spouse May Also Apply)

This Group Security is for Members and Their Families at Low Group Premiums.

This coupon entitles you to a 1959 Up-to-date Portfolio of I.M.A. coverages and rates.

MAIL TODAY TO:

I.M.A. Group Insurance Administration Office
Joseph K. Dennis Company, Inc. Counsellors & Administrators
Suite 1027—Insurance Exch. Bldg.
175 W. Jackson Blvd., Chicago 4

Please send me descriptive material and rates for the following:

☐ No. 1—Accident-Sickness Disability Income Program
☐ No. 2—Accidental Death & Dismemberment Program

Name_____

Age (Member) Age (Spouse)

Address_____

City & State_____

urement of the employee's adjustment on the job. In the following year, while a member of the medical staff at the plant, he conducted the study which is the basis for his article in this issue, "Detection and Management of Emotional Disorders by the Industrial Physician." Dr. Hipps took his present position with J & L in September, 1958. He holds the M.P.H. and Sc.D. (Hygiene) degrees from the University of Pittsburgh.

WILLIAM R. BUCKLEY, M.D., possesses rarely encountered qualifications for a practice in dermatology that emphasizes industrial problems. His early training and experience were in chemical engineering and production. In the early 1940's he left this field and began medical studies at Boston University. After an internship at Boston City Hospital and two years as a captain in the Medical Corps, U.S. Army, he began a general practice at Lynn, Massachusetts. In conjunction with his practice, he served as plant physician to the Lynn plant of the General Electric Company and took courses at the Harvard School of Public Health. There followed two years of training in dermatology at Dartmouth Medical School. A third graduate year was spent in the course in industrial medicine at the University of Cincinnati, during which emphasis was given to the dermatologic problems of industry. Since 1954, Dr. Buckley has been consulting dermatologist to the Eastman Kodak Company. He is senior author of the article in this issue, "Dermatitis in a Chemical Industry," and is an abstracter of dermatology literature for this journal.

JOHN L. NORRIS, M.D., is coauthor of the article "Dermatitis in a Chemical Industry," which appears in this issue. Dr. Norris' career in industrial medicine has been centered in the Eastman Kodak Company, whose medical department he joined in 1937. Since 1949 he has headed the medical service at Kodak Park Works, and since 1955 he has carried the additional responsibilities of the office of Associate Medical Director of the company as a whole.

Dr. Norris' high standing among the physicians of his community was clearly shown by his election to the presidency of Monroe County (N.Y.) Medical Society for the term 1950-51. He has served the IMA with distinction on numerous committees over many years' time and now holds the office of Treasurer. He readily musters up the merciless logic and compelling firmness frequently required in that highly essential office. His willingness to serve and his capacity to do so with distinction have kept him busily engaged in the work of a long list of committees of professional societies other than our own, as well as of community agencies.

Dr. Norris received the A.B. degree from Dartmouth College in 1925, having majored in English literature. He thereafter changed the direction of his life's work and studied medicine at McGill University, from which institution he graduated in 1931. He is an assistant professor in industrial medicine at the University of Rochester School of Medicine and Dentistry and is certified in occupational medicine by the American Board of Preventive Medicine.

List of Advertisers

Aloe, A. S., Co. *12a*
Bauer & Black *29a*
Becton, Dickison & Co. *5a*
Cereal Institute *2a*
Chesebrough-Pond's, Inc. *26a*
Dennis, Joseph K., Co. *27a*
Ethicon, Inc. *20a*
Fleet, C. B., Co., Inc. *15a*
Industrial Bio-Test Laboratories *31a*
Karel First Aid Supply Co. *23a*
McNeil Laboratories *1a*
Midwest Hospital & Surgical Supply Co. *32a*
National Medical Supply *31a*
Parke, Davis & Co. *11a*
Pitman Moore Co. ..... *2nd cover*
Schering Corp. *13a*
Squibb, E. R., & Sons ..... *19a and 3rd cover*
Syntex Chemical Co., Inc. *7a*
Vitamins for Industry *32a*
Wallace Laboratories *8a-9a*
Winthrop Laboratories, Inc. ..... *4th cover*

INDUSTRIAL TOXICOLOGIST

Toxicologist with graduate degree. Ph.D. preferred. To direct toxicological activities of large manufacturer of chemicals and plastics which are utilized in practically all industries including food, drug, and packaging fields. Industrial experience in dealing with governmental agencies desirable.

Salary commensurate with education and experience.

Address replies to:

Box 559
c/o Journal of Occupational Medicine
28 East Jackson Blvd.
Chicago 4, Illinois

People and Events

► HAROLD Y. ALLEN, M.D., has been appointed to the newly-created position of Medical Director for the New York, New Haven & Hartford Railroad, New Haven, Connecticut. DR. ALLEN'S primary responsibility will be to organize and develop a medical department within the concept of preventive medicine.

DR. ALLEN graduated from Jefferson Medical College of Philadelphia in 1953, and interned at Jefferson Hospital. After a year of general practice, he studied industrial hygiene at the Graduate School of Public Health, University of Michigan, on a fellowship from the General Motors Corporation.

In February, 1957, he became Medical Director of the Buick-Oldsmobile-Pontiac Assembly Division, General Motors Corporation, Kansas City. The B.O.P. plant medical department received the Certificate of Health Maintenance from the Occupational Health Institute while under the supervision of DR. ALLEN.

Harold Y. Allen, M.D.

He is a member of the Industrial Medical Association and was secretary of the Kansas City component society; a member of the American Medical Association, the Kansas State Medical Society, and a diplomate of the National Board of Medical Examiners.

► GILBEART H. COLLINGS, JR., M.D., became Associate Medical Director of Standard Oil Company (Indiana) on June 1. He will be associated with BRYCE M. REEVE, M.D., Medical Director, at the company's headquarters in Chicago. Previously, DR. COLLINGS was Medical Director of Crane Company, Chicago.

He is a graduate of Clemson College, South Carolina and obtained his medical degree from Emory University's School of Medicine in Atlanta, in 1941. He interned at Maryland General Hospital in Baltimore and in 1942 joined the medical department of Bethlehem Steel Company, Sparrows Point, Maryland.

DR. COLLINGS did post graduate work at Johns Hopkins University in 1945 and received a masters degree in public health with a major in industrial medicine. In 1946 he became Chief of Occupational Health, Tennessee Valley Authority, Wilson Dam, Alabama. He entered the Army in 1955 and was Chief, Industrial Medicine Branch, and Deputy Commander, Army

ANY WAY YOU STRETCH IT

TENSOR® Elastic Bandages Give You Better Compression Over the Longest Time—At the Lowest Bulk Price

- Made with special, heat-resistant rubber, TENSOR by Curity® keeps its stretchy liveliness through laundering and dryer heat.
- Long-stretch action gives you proper compression over greater areas.
- TENSOR is self-comforming. Adjusts comfortably to swelling.
- Thin tips eliminate bulky points . . . easier and safer.
- And you save 33% on bulk put-ups.

CALL OR WRITE Karel

FIRST AID SUPPLY COMPANY

4342 OGDEN AVENUE • CHICAGO 23, ILL.

People and Events

Environmental Health Laboratory until 1957, when he joined Crane Company.

DR. COLLINGS is a Fellow of the Industrial Medical Association, a member of the American Industrial Hygiene Association, the American Public Health Association, the American Academy of Occupational Medicine and is certified by the American Board of Preventive Medicine.

► JOHN C. TROXEL, M.D., will assume the position of Medical Director for Blue Cross-Blue Shield in Chicago on July 1. He has been Medical Director for Swift and Company for the last two years, having advanced to that position from the medical department of Swift's Chicago plant.

DR. TROXEL received his M.D. degree from Indiana University School of Medicine in 1930, and immediately joined the Navy. He interned at the U. S. Naval Hospital in San Diego, and served at a number of naval hospitals during his career in the Navy. In 1946, he was placed on the Navy's inactive list of medical officers, at which time he joined Swift. He is a member of the Industrial Medical Association, American Medical Association, and a Fellow of the American College of Surgeons.

► Officers elected at the 1959 spring meeting of the Central States Society of Industrial Medicine and Surgery are as follows: RICHARD A. SUTTER, M.D., President; PAUL J. WHITAKER, M.D., President-Elect; EUGENE L. WALSH, M.D., Vice-President; and ALLAN P. SKOOG, M.D., Secretary-Treasurer. Directors elected for the 1959-1962 term are: CARL J. LOHMANN, M.D., WILLIAM L. MACON, JR., M.D., J. F. MCCAHAN, M.D., ARTHUR K. PETERSON, M.D., and ARTHUR E. SULEK, M.D. Elected to a one-year term were GEORGE J. COOPER, M.D., AND ROLAND A. JACOBSON, M.D. The latter two are fulfilling the unexpired terms of TRACY E. BARBER, M.D., and LEONARD J. ARLING, M.D., who have severed their relationship with Central States to become associated with the newly-created component society, the Minnesota Academy of Occupational Medicine and Surgery.

► The Minnesota Heart Association presented a Cardiac-in-Industry Conference on April 29 in Minneapolis. JOHN F. SHRONTS, M.D., Medical Director, General Mills, Inc., was chairman of the program committee. He opened the conference with introductory remarks. The official welcome was extended by ARTHUR C. KERKHOF, M.D., Medical Director, Minneapolis Star-Tribune, on behalf of the Minnesota Heart Association, and by HERMAN K. HELLERSTEIN, M.D., Cleveland, Ohio, on behalf of the American Heart Association.

A panel discussion on "The Heart of the Problem" was conducted by DONALD SAVELKOUL, General Counsel, Minnesota AFL-CIO; JOHN F. BRIGGS, M.D., Internist, St. Paul; AUGUST GEHRKE, Assistant Commissioner for Rehabilitation and Special Education, State of Minnesota; and G. R. DIESSNER, M.D., Medical Consultant to IBM Medical Department, Rochester, Minnesota.

Three concurrent round table groups were held, as follows: "Manager Personnel Services" conducted by L. W. BINGER, Personnel Director, Minnesota Mining and Manufacturing Company;

Nurse just tears this new foil suture packet open to give you stronger, more pliable surgical gut. *It's sterilized by electron beam.*

ETHICON®

Industrial

BIO-TEST

Laboratories, Inc.

TOXICOLOGY

Biological Evaluations

Consultation

Radiochemistry

Biochemistry

Microbiology

Pharmacology

Write for Brochure

1810 Frontage Road

Northbrook, Illinois

Crestwood 2-3030

"Employee's Viewpoint" conducted by EDWARD J. GEARTY, Minneapolis attorney; and "Industrial Physician's Viewpoint" conducted by TRACY E. BARBER, M.D., Medical Director, Hormel Company, Austin, Minnesota.

The banquet speaker was WILLIAM E. R. GREER, M.D., Medical Director, Gillette Safety Razor Company, Boston. His subject was "The Effects of Stress and Strain on the Cardiac in Industry."

► Officers and directors elected at the recent annual business meeting of the Texas Industrial Medical Association for the year 1959-1960 are: President—MAX E. JOHNSON, M.D.; President-Elect—NOBLE B. DANIEL, M.D.; Vice-President—CARL A. NAU, M.D.; Secretary-Treasurer—J. G. BURDICK, M.D.; Directors—ERVIN E. BADEN, M.D., VAL C. BAIRD, M.D., ROBERT J. POTTS, M.D. and ROBERT A. WISE, M.D.

► An Occupational Health Seminar is being held June 22-27 at the National University in Bogotá, Columbia. It is the first such Seminar to be held in the republic, and is sponsored by the Industrial Hygiene Service, Colombian Ministry of Public Health and the Columbian Institute of Social Security. The program is concerned primarily with the subjects of pneumoconioses, occupational dermatoses and public health engineering.

North Americans who are appearing on the program are HARRIET L. HARDY, M.D., Associate Physician in charge of Occupational Medical Clinic, Massachusetts General Hospital, Boston; DONALD J. BIRMINGHAM, M.D., Chief Dermatologist, U.S. Public Health Service; and THEODORE HATCH, Professor of Occupational Health Engineering, Graduate School of Public Health, University of Pittsburgh. Also on the program is JOHN J. BLOOMFIELD, who for many years was Assistant Director of the Division of Industrial Hygiene, U.S. Public Health Service. He is now with the International Cooperation Administration as Regional Consultant in Industrial Hygiene for Latin America in Lima, Peru. Chairman of the Organization Committee for the Seminar is DR. ROBERTO ACOSTA B., Director of the Colombian Industrial Hygiene Service. DR. ACOSTA developed the program, which, in addition to the formal presentations, provides for numerous discussion periods.

SALVAGE
those "critical" days each month . . .

MENTREX
relieves symptoms of **DYSMENORRHEA**

- **Provides a psychic "lift"**
- **Affords potent analgesia**
- **Relieves smooth muscle spasm**
- **Promotes diuresis**

Relieves menstrual pain to promote efficiency—reduce absenteeism.

Helps solve a costly industrial problem.

Composition: Ephedrine Sulphate ⅛ gr., Caffeine Citrate 1 gr., Calcium Gluconate ½ gr., Hyoscyamine Sulphate 1/1000 gr., Acetylsalicylic Acid 3 gr., Acetophenetidin 2 gr.

Dosage: 2 tablets or capsules every four hours.

Supplied: Tablets or capsules in bottles of 100, 500 and 1000.

Mail this valuable coupon—NO OBLIGATION

NATIONAL MEDICAL SUPPLY
6121 West Belmont Avenue
CHICAGO 34, ILLINOIS

Please send me a clinical trial supply of MENTREX and special industrial prices and packaging information.

Name

Firm Name

Address

City State

Industry is for PROFIT

The percentage of the cost of its product which is LABOR is the responsibility of the personnel director, the safety engineer and the MEDICAL DEPARTMENT.

To protect management's investment in hiring and training, a good program of man-maintenance is a must.

For a complete line of vitamin dietary supplements sold exclusively for this purpose—with no retail outlets, please write —

A Specialized Consultative and Sales Service

Catalog available

Vitamins **FOR INDUSTRY, INC.**

3456 WEST OLYMPIC BOULEVARD, LOS ANGELES 19, CALIFORNIA

We solicit your inquiries on Special Situations

1. **Everest and Jennings Wheel Chairs**
2. **Hollywood Wheel Chairs**

Hollywood Wheel Chairs are attractive, comfortable and easy to propel. They give freedom of movement in confined spaces and fold easily for car transportation. No other chair offers so many "expensive chair" features at such low cost.

Detachable Footrests.

Both standard footrests and elevating legrests are detachable and interchangeable. No nuts or bolts involved. Simple Snap Lock permits detaching or replacing in seconds without tools. Such easy removal of these units permits close head-on approach to bed or tub.

Complete catalog on various types available upon request.

MIDWEST HOSPITAL & SURGICAL SUPPLY CO.

Chicago (21) Phones HU 3-2066-67 7209 So. Halsted St. Illinois